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At a general staff dinner of the *Railway Age Gazette* held at the Engineers' Club, New York, March 21, the members of the staff gave William H. Boardman, president and editor, a bronze lamp in recognition of his forty years of service on the paper.

On March 21, Ernest McCullough became a member of the staff of the *Railway Age Gazette*, with direct supervision over the civil engineering department. Mr. McCullough comes to us from the editorial staff of *Engineering-Contracting;* he has had wide experience in railway location and construction, especially in the West, and is the author of several works in civil engineering. He will make his headquarters at our Chicago office.

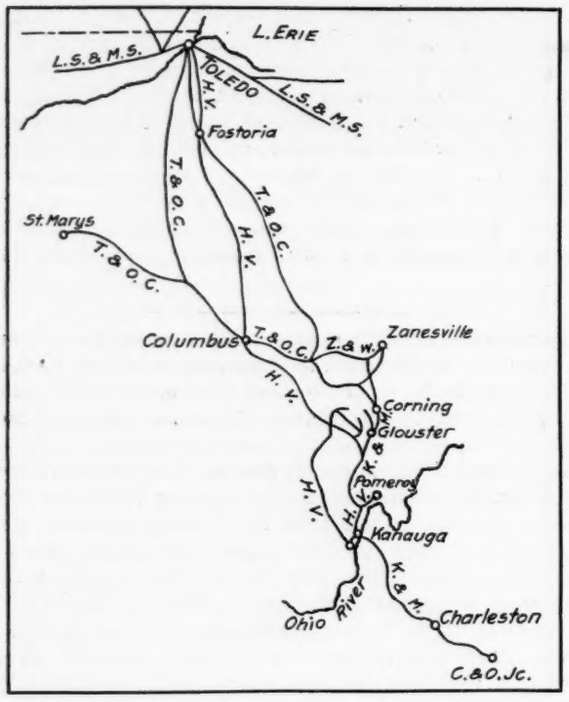
Congress is talking about President Taft's railway bills every day; but the talk produces nothing but confusion. Those members who speak on the subject either on the floor of the Senate or in the Senate or House committees, seem to be actuated by considerations of party expediency almost entirely. These bills proposing amendments to the Interstate Commerce law have now been before Congress over a month in their latest form—not to mention the two months' consideration that was given to them in committee and through the newspapers before they were rewritten—and they have made no progress at all unless it be backward. Senator Cummins prolonged his speech last week so that it occupied four days; but apparently his only purpose was to show that he was a true insurgent. His criticisms were perfunctory and so evidently designed merely to sand the track that no one weighed them with care. On Monday of this week Senator Elkins made a "set speech" in defense of the bills, but his reply was as dull as Senator Cummins' "attack." On Tuesday Senator Clapp, the second chief insurgent, spoke. Mr. Cummins exhausted the senators' patience, Mr. Elkins made them laugh and under Mr. Clapp's remarks they nearly—or quite—went to sleep. At the other end of the capitol the bill is still in committee and each day brings out some new proposed amendment. The reporters, meantime, ordered by their editors to treat this news as important, have had a difficult job in making copy and they even have to talk about amendments which are under consideration but "not yet drafted." When the bill finally gets before the house it may be that the reasons for and against the commerce court, the prohibitions of mergers, the legalizing of traffic agreements and the limitation of railway capital issues, will be set forth in cogent statements and receive intelligent consideration; but at present about all that can be said is that the President wants action and the majority of the congressmen want action only so far as may be necessary to redeem their party pledges. The study of the real merits of the President's proposals is something which, apparently, they would like to avoid.

The report of Chief Inspector B. W. Dunn of the Bureau of Explosives—this short title is proper, for it is used by Colonel Dunn himself—is an interesting document. We give, in another column, the abstract of the work done; but the report itself is too solid for reproduction except in full and an abridgment would not do it justice. A reduction in the annual losses from accidents in transporting explosives by rail of 99½ per cent. in less than three years cannot be due to good luck or chance; the usefulness of the inspections, which are made by the bureau, must be real and widespread. The condemnation of 11,497 packages of explosives in one year as not properly put up tells the same story in another way. The number of persons killed was, in 1907, fifty-two; in 1908, twenty-six, and last year, six. The chief inspector gives a list of roads which do not belong to the bureau, and it contains a few prominent ones. He says that all these are disobeying the law, for the government regulations assume the employment of the bureau as one of the precautions for safe transportation. But though some of the railways are neglectful the steamship companies appreciate the value of inspection, and nine prominent Atlantic coastwise lines have joined Col. Dunn delivered last year nine lectures, James L. Taylor 155, and local inspections 51. By the revised regulations of the bureau placards are required on a much smaller number of cars than at first, this making more prominent those cars which are placarded. This important change was accomplished by abolishing the placard requirement as regards certain classes of goods which are not very dangerous. Several reckless shippers have been punished in the courts. Encouraged by railway officers, the chief inspector offers the very practical suggestion that inspection of *all* of the work of freight house and freight train men, and not alone that which is dangerous, should be done by a single authority. There is room, of course, for very much closer inspection of this department of railroading provided that, as Col. Dunn intimates, the inspection is such as to educate the workmen and not fill their minds with fears of punishment for what may seem to them trifling faults.

THE HOCKING VALLEY AND THE CHESAPEAKE & OHIO.

The acquisition of control of the Hocking Valley by the Chesapeake & Ohio gives the C. & O. an outlet to the lakes, and gives it a north and south line comparable in some ways with the north and south line recently acquired by the Baltimore & Ohio through its gain of control of the Cincinnati, Hamilton & Dayton, but it does not give the Hawley system a direct connection between its lines west and southwest of Chicago and the Chesapeake & Ohio. This is very plain from the map. If Hawley traffic officers should solicit freight from the eastern seaboard and route it over their own lines, it would now have to go over the C. & O. to Gauley Bridge, over the H. V. to Toledo, and from there southwest almost to St. Louis over the Clover Leaf before it could get on to the Alton. If, however, the C. & O. later buys the Chicago, Cincinnati & Louisville, as is persistently rumored, it will be able to route freight in a direct and natural way from the seaboard to Cincinnati, and from there to Chicago, where it can deliver it to the Alton or Clover Leaf, as the case may be.

Control of the Hocking Valley has previously been held by



The Hocking Valley, the Toledo & Ohio Central and the Kanawha & Michigan.

five trunk lines, the Pittsburgh, Cincinnati, Chicago & St. Louis holding one-third of the $5,770,000 common stock; the Lake Shore & Michigan Southern holding one-sixth; the Baltimore & Ohio holding one-sixth; the Erie holding one-sixth, and the Chesapeake & Ohio holding one-sixth. This stock, which was acquired in 1903 by the trunk lines, has been sold to the C. & O. for a price said to be between $8,000,000 and $9,000,000. The stock was bought by the trunk lines at a time when plans were being made for the merger of the Hocking Valley, the Toledo & Ohio Central, the Kanawha & Michigan and the Zanesville & Western. The Ohio courts have held that the merger plans were illegal, and have ordered the Hocking Valley to divest itself of control of the Toledo & Ohio Central and of the Kanawha & Michigan. This order the Hocking Valley has now complied with by selling its Toledo & Ohio Central and the Zanesville & Western stock to the Lake Shore & Michigan Southern, and its Kanawha & Michigan stock to the Chesapeake & Ohio and the Lake Shore jointly. It will be seen, therefore, from the map that the Lake Shore and C. & O. have each got a north and south road extending from Toledo to Gauley Bridge, a junction with the Chesapeake & Ohio main line. Just west of Gauley Bridge and across the river from it is Deepwater, the northern terminus of the Virginian Railway.

When the Baltimore & Ohio was looking out for a north and south line it probably considered the Hocking Valley, but it is equally probable that the New York Central would have been unwilling to let the Lake Shore sell its interest in the Hocking Valley to a road which competes in so many fields with the New York Central Lines. Apparently the same objection did not apply to a sale to the Chesapeake & Ohio. The decision to let the C. & O. have the Hocking Valley may have been influenced somewhat also by the fact that the New York Central Lines will get an entrance into Baltimore and incidentally into the soft coal regions when the new line between New Haven, Pa., and Cumberland, which is being built by the Western Maryland, is finished.

The C. & O. is to finance the purchase of the Hocking Valley by the issue of $31,390,000 convertible 4½ per cent. bonds. There were $37,000,000 of these bonds recently authorized by the directors, and stockholders are to meet on April 28 to ratify this action of the directors and the authorization of an equal amount of stock to provide for the conversion of the bonds at par at the option of the holder after one year.

The preferred stock of the Hocking Valley, of which there is $15,000,000 outstanding, has equal voting rights with the common, so that to have absolute control it will be necessary for the C. & O. either to acquire a part of this preferred stock or to retire it. The stock is subject to call at par. In addition to the sum involved in the Hocking purchase, the C. & O. has authorized in the past two years a total of $10,000,000 improvements, so that only a part of the total authorized issue of convertible bonds will be needed to carry out present plans, and if the Chicago, Cincinnati & Louisville is to be bought later, new financing may not be required.

As the sale of the Toledo & Ohio Central and Kanawha & Michigan has added $13,433,300 cash to the Hocking Valley treasury only $1,566,700 more would be required to retire the $15,000,000 preferred stock of the company at par, and with an accumulated surplus of $4,513,259 on June 30, 1909, which will probably come to $5,000,000 by the close of the present fiscal year, it can be seen that the company could make this retirement with little inconvenience.

If the preferred stock were retired in this manner the company would show earnings on the common on the present basis of earnings at the rate of 23.9 per cent.

The minority stockholders of the Kanawha & Michigan have been offered $72 a share for their stock. This is the same price that was paid for the majority stock by the Hocking Valley.

LIGHT CENTER SILLS FOR STEEL CARS.

The importance of ample section of center sills and cover plates for resisting buffing in steel passenger cars has been demonstrated by the results of collisions and wrecks, but, notwithstanding this, there is a large amount of steel equipment building which is manifestly deficient in this particular. It is unusual in freight cars, which are much shorter and should therefore have greater stiffness for a given area than the longer passenger car, for such defects to be shown up in regular service, however severe, but in the last report of the arbitration committee of the Master Car Builders' Association there is a case in which this question is discussed.

A 40-ft., 80,000-lb., steel underframe car was offered to the owner in interchange and refused on account of two steel center sills and one side sill being badly bent. The offering road claimed that the defects were the result of ordinary service, the parts yielding to the extent of having taken permanent set at four distinct places in the longitudinal framing, the offsets amounting to as much as 2½ to 3 in. These center sills consisted of two 15-in., 33-lb. channels without cover plates, and a comparison is made to show their slight resist-

ance as compared with cars of similar capacity, but of good design. Car A, with the light sills, has a buffing area of 19.8 sq. in., while car B, of good design, has a section of 29.24 sq. in., a difference of 47.5 per cent. in favor of car B. The moment of inertia, which in columns of the same length is a measure of the stiffness, in car A is 625.2, while in car B it is 2,368.9, a difference of 279 per cent. in favor of car B. The section modulus, which measures the comparative strength of sections, is for car A, 83.4, and for car B, 236.9, a difference of 184 per cent. The safe load for the center sills on car A is 43,000 lbs., while on car B it is 123,000 lbs., a difference of 286 per cent.

It is thus shown that by the addition of less than 50 per cent. more weight in the center sills and cover plates, which is a small percentage of the total weight of the car, their stiffness in resisting buffing stresses and the strength in carrying their portion of the load are increased nearly 300 per cent.

The arbitration committee ruled that the damage was of such an extent that repairs were necessary and the offering road was responsible for them, thus establishing the principle that the design and proportion of steel cars were not proper subjects for discussion in disputes arising under the interchange rules. While this is a fair decision under the present rules it suggests the desirability of adopting some limits of cross section and moments of inertia for the center sills of steel cars, both freight and passenger, as there is a tendency for some railways to buy cars which are of poor design and have light center sills because they are cheaper than others where these members are properly designed. In freight interchange some railways, which are careful to secure substantial designs for their own cars, become liable for the distortion of weaker cars owned by other roads, and it would seem that a majority of the M. C. B. votes ought to favor a simple rule which would prevent the continuation of orders for cars of weak design and establish standards which would place some minimum limits on the area of buffing members of the underframe.

At the M. C. B. convention in 1908 a committee report on steel passenger cars discussed the question, as it was under instruction to recommend a standard sectional area for center sills and cover plates. It reported that it had found a great difference in the design and area of center sills, one type having an area of 10.66 sq. in., another 18.52 sq. in., and another 50 sq. in., and in any standard area it would be necessary to take account of the length of the car, the application of the load and the shape of the longitudinal sills; for these reasons it did not make definite recommendations for standard areas.

On account of the liability of the collision of freight and passenger cars, the latter should be at least as strong in center sill construction as the strongest freight cars and a higher factor of safety should be used. The committee recommended that steel passenger cars in through service should be capable of withstanding a shock of 150,000 lbs. on the draft gear and 250,000 lbs. on the buffers, making a total of 400,000 lbs. compression, in which the combined stress on the sills should be 12,500 lbs. per sq. in., and in no case exceed 15,000 lbs. For cars in suburban service the fiber stress might be increased to 20,000 lbs. For freight cars a compression load of 500,000 lbs. should be assumed and this should not cause stresses exceeding the elastic limit of the metal sills. The weak cars, as well as the strongest representing current practice for both freight and passenger service, are those in which the center sills are continuous beams, having a channel or eye-beam section, some in freight cars, as in the example given above, without cover plates, some with partial cover plates and others in passenger cars with complete top and bottom cover plates. It is in this class of construction that it is possible to establish standards for center sills which are safe. By commencing in this way, steel car construction could in time be brought under such control as to be safe and satisfactory.

LIGHT FROM EUROPE ON PROPOSED WATERWAY DEVELOPMENT IN THE UNITED STATES.

A document recently issued by the British Royal Commission on canals and waterways throws an instructive sidelight on the campaign for the development of inland waterways in the United States. The document referred to is an exhaustive report on the waterways of Belgium, France, Germany and Holland, by W. H. Lindley, assistant commissioner. It deals with all their various phases—engineering, operating, financial, traffic, etc. It ought to be read and compared with the report of the board of United States army engineers on the proposed lakes-to-the-gulf deep waterway by all who wish to form an intelligent opinion about the desirability of additional extensive development of inland waterways in the United States. The data given by Mr. Lindley strongly sustains the contention of the army engineers in their report that the Mississippi and its tributaries, with 14,000 miles of navigable waters, are now, as they have been developed and are maintained by the federal government, as good an inland waterway system as any in Europe.

In France the waterways, which are considerably used, include about 4,500 miles of rivers and 3,000 miles of canals, a total of 7,500 miles. In 1879 a program was adopted of developing them all to a minimum standard depth of 6.6 ft., and in 1905 this has been carried out on 1,306 miles of rivers and 1,671 miles of canals. The maximum depth attained is 8.5 ft., and the great bulk of the traffic is carried on water varying from 5 ft. in depth down to 1.5 ft. The largest estimate of the length of German waterways is 8,500 miles; the mileage on which the traffic is considerable is 6,200. The depth of the free rivers varies from 3 or 4 ft. on those, such as the Oder, Elbe and Vistula, having unstable beds, to 5 or 6 ft. on those, like the Rhine and the Upper Main, having stable beds, and on the lower sections of the larger rivers the depths become as much as 8 to 10 ft. The depths of the canalized rivers are from 2.6 ft. to 7.5 ft., and of the canals from 4 ft. to 10 ft., the latter depth being very rare, and depths of 4 to 6 ft. being the most common.

Compare these figures with those given by the board of army engineers regarding the Mississippi and its tributaries. Even during low water seasons boats of a draft of 25 to 30 ft. may easily be sent from the Gulf of Mexico 270 miles to New Orleans, Baton Rouge and Bayou Sara. Boats of 9 ft. draft may be sent 840 miles thence to Cairo, Ill.; boats of 8-ft. draft may be sent from Cairo to St. Louis, 182 miles, and boats of 4½-ft. draft may be sent from St. Louis up the Mississippi and Illinois rivers and the Illinois state canals to Chicago, 365 miles. The Mississippi's minimum depth to St. Paul is 4½ ft., the Missouri river's minimum depth is 4 ft. as high as Kansas City and 2½ ft. to Fort Benton, 2,285 miles from St. Louis. The Ohio has a depth of 9 ft. from Cairo to Pittsburgh, 1,000 miles; the Monongahela, 5 ft. from Pittsburgh, 128 miles to the Pennsylvania coal fields; the Kanawha, 6 ft. for 90 miles to the West Virginia coal fields, and numerous other tributaries of the Mississippi, including the Allegheny, Little Kanawha, Muskingum, Columbia, Tennessee, St. Croix, Minnesota, Osage, St. Francis, Yazoo, Arkansas and Red, have navigable depths of 2 ft. and upward.

Since the Mississippi and its tributaries, as the figures show, actually constitute a better waterway system than any in Europe, why is it that the river and canal traffic of Europe is growing faster than the railway traffic, while in this country the railway traffic is rapidly increasing and the river and canal traffic steadily decreasing? One reason is that municipalities and private concerns in Europe have provided the waterways with good terminals, and that boats and barges have been developed which are specially adapted to modern river and canal traffic, whereas in this country almost nothing has been done either by municipalities or private concerns to provide river boats with suitable and adequate terminals, and there has been almost no improvement for thirty years in the

boats used on rivers. But the main reason for the growth of river and canal traffic in Europe and its decline in this country is to be found in the differences between the railways and the railway rates of Europe and America.

Mr. Lindley gives a great many figures regarding the freight rates of European railways and waterways. The average railway rate per ton-mile in France is 14 mills and in Germany 13 mills. It is impossible to ascertain the averages for the waterways, as complete statistics have never been compiled. But numerous figures are given for different waterways. On the Rhone in France they are from 7.8 to 15.6 mills per ton per mile, and rise as high as 18.6; on the Seine, 26 to 56; on the Canals du Centre and du Midi, 6.2 to 7.8, and on the canals of the northeast and east of France, from 3.8 to 4.6. The average rate on a wide variety of commodities moving from Havre, Rouen and Lens to Paris is 5.78 mills. A very conservative estimate of the average for all traffic on all the waterways of France is 6 mills. It must be borne in mind that this is figured on the basis of the waterway mileage, which is on the average fully 50 per cent. greater than the rail mileage. If the average *absolute* waterway rate were divided by the shorter mileage of competing railways, the average waterway rate would rise to fully 8 mills per ton per mile. Mr. Lindley's figures for the rates of German waterways are much less full, but those which he gives for traffic of various kinds and between a number of important centers average 5 mills, and on the basis of the shorter railway mileage would average at least 6.5 mills. The waterway rates of Europe are therefore not 50 per cent. of those of the railways of Europe.

The average rate per ton per mile on the railways of the United States in 1907 was 7.59 mills, and this, of course, includes high grade as well as low-grade traffic; traffic hauled over mountain ranges and in sparsely settled territory as well as that hauled on easy grades and in thickly settled sections. On many American roads which handle mainly low-grade traffic or have especially favorable operating conditions the average rate is as low as or lower than on the waterways of either France or Germany. The average rate of the New York Central, in 1907, was 6.4 mills, of the Pennsylvania Railroad, 6.3 mills; of the Cincinnati, Hamilton & Dayton, 6 mills; of the Illinois Central, 5.77 mills; of the Lake Shore & Michigan Southern, 5.27 mills; of the Big Four, 5 mills; of the Detroit, Toledo & Ironton, 4.36 mills; of the Norfolk & Western, 4.95 mills, and of the Chesapeake & Ohio, 4.33 mills. And while these railway rates cover the entire cost of transportation the rates on the waterways of Germany and France do not cover the entire cost. The annual interest and maintenance charges on waterways paid by the government of France amount to 4.2 mills for every ton-mile of freight carried. The similar expenditures in Germany amount to 8½ tenths of a mill, including the Rhine and the Elbe, on which the traffic is very large and the expenditures have been small. Excluding these rivers the expenditures for maintenance and interest in Germany amount to 2 mills per ton per mile. Adding these figures to the average rates makes the *total* average cost of water transportation in France not less than 10 mills and in Germany not less than 7 mills. If the calculation be made on the basis of the shorter railway mileage the cost in France rises to 12 mills and in Germany to 7½ mills. The former exceeds the average railway rate in the United States, and the latter almost equals it. If allowance be made for the superiority of rail over water service, the conclusion is unavoidable that rail transportation in the United States is very much less costly than water transportation in Europe. The rivers and canals of Europe could not compete with the railways of the United States any more successfully than can the existing rivers and canals of the United States.

Some of the advocates of large expenditures for additional waterway development in this country recognize this fact, and therefore advocate the development of deeper waterways than any in Europe. Some of these favor the construction of a 14-ft. channel from the Great Lakes to the Gulf, on the theory that it would be used by lake and ocean-going vessels. But fully 95 per cent. of the steamships on the lakes draw over 14 ft. of water, and more than 80 per cent. of them draw in excess of 19 ft.; and, of course, ocean vessels could not use any waterway that lake vessels could not. Finally, it is argued that a great ship canal should be built from the lakes to the gulf. But engineers who have carefully investigated the subject contend that a towboat with barges can transport commodities on a river or canal cheaper than a lake or ocean steamship, and a towboat and barges can navigate in 5 ft. of water as well as in 50. Thomas W. Symons, colonel corps of engineers, U. S Army (retired), after investigating this subject for the state of New York, concluded that the cost of transporting grain by a typical lake freighter on a deep-water canal would be 38 per cent. greater than by a towboat and barges on a barge canal, and it was this conclusion that led the State of New York to decide to make the Erie canal only 9 ft. deep instead of over 20 ft. In making his estimate Colonel Symons took no account of the greater cost of constructing and maintaining a deep waterway. His investigation related merely to the cost of operating the various kinds of boat.

In view of the foregoing facts the conclusion seems inevitable that it would be the very height of folly for the government of the United States under present transportation and commercial conditions to spend hundreds of millions, as is proposed, for the additional development of inland waterways. All the evidence tends to show that the only way by which any considerable commerce could be diverted to the present or proposed waterways would be to compel the competing railways to raise their existing rates on low-grade commodities and refrain from making reductions. In France the government consistently follows the policy of compelling the railways to keep their rates at least 20 per cent. higher than the rates on the competing waterways, this practice, as Mr. Lindley says, "being based on the opinion that the waterways are considered not to be able to compete at equal freights with the railways, owing to the longer duration of transport." Unless the governments of the states and of the United States are prepared to adopt a similar policy rivers and canals will continue to be unable to compete with the railways and the proposed expenditures for their development will, if made, turn out a sheer waste of money.

UNITED STATES STEEL CORPORATION.

The total production of finished products for sale in 1909 by the United States Steel Corporation equaled about 75 per cent. of the normal maximum productive capacity of the property. There were 9,859,660 tons of finished products produced for sale to customers outside of the organization in 1909. This is an increase over 1908 of 58.8 per cent. There were 11,618,350 tons of pig iron, spiegel and ferro, produced in 1909, an increase over the previous year of 67.5 per cent.; and there were 13,355,189 tons of Bessemer and open hearth steel ingots produced, an increase over 1908 of 70.3 per cent. The volume of business done by all companies during the year, as represented by their combined gross sales and earnings, including sales made between subsidiary companies and gross receipts of transportation companies for service rendered both to subsidiary companies and to the public, amounted to $646,382,251. This compares with gross receipts of $482,307,840 in 1908. From the gross business the corporation was able to earn, after paying expenses, $131,491,414, in 1909 as against $91,847,711 in 1908. It will be seen, therefore, that with a tonnage output of basic semi-finished and finished articles greater by about 66 per cent., the company had gross sales greater by 34 per cent. in 1909 than in 1908 and earnings 43 per cent. greater in 1909 than in the year before.

There was charged off for depreciation and extinguishment

funds $5,884,367 in 1909, as compared with $3,844,214 in 1908; and there was charged for extraordinary replacement $16,109,687 last year, comparing with $11,532,897 the year before. After paying interest on bonds and sinking funds there was net corporate income of $79,073,695, comparing with $45,728,714 the year before. In 1908 7 per cent. was paid on the preferred stock and 2 per cent. on the common stock; in 1909 7 per cent. was paid on the preferred and 4 per cent. on the common. This left a surplus after payment of dividends of $33,521,918 in 1909 and $10,342,987 in 1908. Last year there was charged off for additional property and for the discharge of capital obligations $10,000,000, and for reserve fund to cover advance mining royalties $3,200,000, and in addition there was set aside for expenditures at Gary, Ind., $5,000,000. None of these charges were made against income in 1908.

Total annual wages amounted to $151,663,394 in 1909 and $120,510,829 in 1908. This is an average wage of $776 last year and $729 the year before. The prices, however, received for products were considerably less in 1909 than in 1908. On domestic business, on all rolled and other standard products prices averaged 14.3 per cent. less; on export shipments the average price was 7.8 per cent. less than in 1908.

The United States Steel Corporation is in a financially strong position to handle a very large volume of business, and since the close of the calendar year the new orders have just about borne out expectations, notwithstanding the unusually heavy placing of new business for future delivery which took place during the closing quarter of 1909. At the close of the year the unfilled export orders on the books of the United States Steel Products Export Co. amounted to 462,603 tons. At the beginning of 1910 the combined books of the other subsidiary companies showed unfilled orders for rolled and other finished products of 5,927,031 tons. The production of the various subsidiaries in 1909 compare with figures for 1908 as follows:

	Tons	
	1909.	1908.
Iron ore mined	23,431,047	16,662,715
Coke manufactured	13,590,112	8,169,931
*Coal mined	3,889,021	3,008,810
Limestone quarried	3,496,071	2,186,007
Blast furnace production	11,618,350	6,934,408
Bessemer ingots	5,846,300	4,055,275
Open hearth ingots	7,508,889	3,783,438
Rails	1,719,486	1,050,389
Total finished products†	9,859,660	6,206,932

*Not including that used in making coke.
† Including rails.

It is interesting to note that among the finished products the production of steel car wheels increased from 7,223 tons in 1908 to 67,985 tons in 1909. This is the greatest proportionate increase in the output of any class of finished products and is accounted for by the fact that 1909 was the first complete year of operation of the Schoen steel wheel plant by the Carnegie Steel Company.

The total current assets, including inventories, amounted to $291,018,167 on Dec. 31, 1909, comparing with current assets of $239,222,176 on Dec. 31, 1908. Cash on hand amounted to $58,521,113 last year and to $49,548,053 the year before. Current liabilities last year totaled $61,144,726, and $43,031,854 the year before. Of these current liabilities $29,734,951 was accounts payable and payrolls in 1909, and $20,858,014 in 1908. The only other considerable increase in liabilities is in common stock dividend, which in 1909 included ¾ per cent. extra dividend, payable March 30.

The total inventory valuation included in current assets was $163,811,280 in 1909, and $143,179,629 in 1908. The greater amount of inventories on hand is due largely to the increased volume of business being conducted at the close of the year as compared with the volume of business conducted at the close of 1908. The item of iron ores in stock piles at mines, valued at $67,692,137 in 1909, and $65,783,299 in 1908, shows an increase in total valuation of 2.9 per cent. The tonnage on hand, however, was 10 per cent. greater, the average price at which ores were inventoried being somewhat lower in 1909 than in 1908. The inventory valuations include profits on materials which have been purchased by one subsidiary from another. These profits are not included in the reported earnings of the entire organization until such profits have been converted into cash.

Undivided surplus of the Steel Corporation and subsidiary companies amounted to $151,354,528, which includes the $25,000,000 paid in as working capital in 1901. Since 1901 the company has issued net $59,482,593 bonds, of which $20,000,000 are Steel Corporation bonds and the remainder purchase money obligations and bonds of subsidiaries. The total payments made since 1901 on capital account amounted to $403,817,202. Of this amount $241,553,432 was charged to surplus net income, $10,000,000 was charged to surplus appropriated since January 1, 1910, to cover payment of capital expenditures, and $92,781,176 was charged to capital surplus and to undivided surplus.

For the Gary plant, which began operation last year, the Steel Corporation has appropriated $55,000,000 from net income. Of this amount $10,547,011 has been spent for real estate and development work in the city of Gary, and $38,073,181 for construction of the manufacturing plant. In addition, there has been spent $5,258,405 for terminal railway work, but this outlay has been financed by the Chicago, Lake Shore & Eastern by the recent sale of $9,000,000 bonds, guaranteed jointly by the Elgin, Joliet & Eastern and the United States Steel Corporation.

During the year there were put in operation at Gary four blast furnaces, making a total of six in operation at the close of the year; 28 open hearth steel furnaces, the heavy rail mill, the blooming and large billet mill and the 18-in. merchant bar mill. Among other work that is being undertaken at Gary there has been authorized to be built by the American Bridge Co. a bridge and structural plant, consisting of two units, with a total annual capacity of 120.000 tons of fabricated structural material. During 1909, 519,197 tons of pig iron, 511,601 tons of open hearth steel ingots, 324,856 tons of open hearth steel rails and 73,480 tons of billets and merchant mill products, and 6,862 tons of foundry products were produced at Gary.

NEW BOOKS.

Subsidy for American Ships Only. Pamphlet V. Merchants' Association, New York City.

This is a pamphlet of 40 pages containing the argument presented by a committee of the Merchants' Association before the Merchant Marine committee of the lower house of Congress, February 3. The Merchants' Association favors subsidies for American-built ships, but presented this argument in opposition to the Humphrey bill, because it is believed that that bill will permit the diversion of the public money to foreign-built ships.

FOREIGN RAILWAY NOTES.

The Baden State Railways after investigation decided that the hearing of locomotive engineers is affected by vibrations of the engine communicated from the floor on which the men stand. To prevent this, cocoanut mats are to be provided, both for engineman and fireman.

The Swiss are preparing to show the whole of Switzerland to the delegates to the eighth International Railway Congress, which is to be held in Berne July 4 to 16, which will make it well worth while to go. It is reported that 1,300 are expected, 200 speaking German, 500 French and 600 English (or the Yankee-dialect thereof). The French-speaking delegates are largely Russians and others from the outlying parts of the world.

Letters to the Editor.

TRAIN RESISTANCE ON THE VIRGINIAN RAILWAY.

Norfolk, Va., March 19, 1910.

To the Editor of the Railway Age Gazette:

Referring to the letter in your issue of February 25, by William G. Raymond, the explanation asked for by Prof. Raymond is that the second train referred to of 120 cars—which astonished him so much—was hauled by a Mallet compound engine of about 65,000 to 66,000 lbs. tractive power. The first train was hauled by the Mikado engine—correct information concerning which Mr. Raymond seems to have.

R. P. C. SANDERSON.

FASTEST WORK IN TUNNEL DRIVING.

New York, March 14, 1910.

To the Editor of the Railway Age Gazette:

In the article in your issue of March 11, p. 519, by R. B. Woodworth, entitled "Subaqueous Tunnels," certain data is given in regard to speed, etc., of various rock tunnels which seems to differ from data published elsewhere, and while these differences do not affect the argument that there has been some improvement in this country since the Hoosac tunnel was built, in the interest of accuracy it would seem to be worth while to note these so that corrections may be made where necessary.

I can find no record of any work having been done on the Newhouse Drainage tunnel in 1906. Does this refer to the Central tunnel of the Big Five Company which was 6 ft. x 9 ft. and driven at that time at Idaho Springs, Col.? It is stated that the Newhouse Drainage tunnel was 12 ft. x 12 ft., and the Hot Time Lateral 5 ft. x 7½ ft.

The length of the Roosevelt Drainage tunnel is given as 16,700 ft. instead of 15,550 ft. and the best month's work 436 ft. in March, 1909, while the average advance for a "long time" was 362 ft.

The record for the Gunnison tunnel for one month is given as 824 ft. instead of 842 ft.

The cost of the Elizabeth tunnel of the Los Angeles aqueduct is given as $35.81 per lineal foot instead of $31.81, and the best month's work 476 ft. in March, 1909, in the south heading.

While all the above records are for one heading, the record for the Bitter Root tunnel of 580 ft. in May, 1908, is for both headings. The best month in a single heading in this tunnel is stated to be 385 ft. at the west end in January, 1909, and for the whole tunnel 753 ft. in that same month.

The stated record of 550 ft. per month for the new Croton aqueduct is apt to be misleading, as this amount was never actually driven in a single month, but represents the rate per month based on a single week's run of 127 ft.

The record for the Loetschberg is given in your article as 574 ft. in September, 1907. I find it stated elsewhere, however, that in:

April, 1908,	the	north	heading	was	driven	.....	656 ft.
June, 1909,	"	"	"	"	"	.....	1,990 "
July, 1909,	"	"	"	"	"	.....	1,013 "
Aug., 1909,	"	"	"	"	"	.....	1,915 "

These last three months the heading was in limestone.

The best record for the Simplon tunnel that I have been able to find is 685.5 ft. in July, 1904, instead of 755 ft., as stated in your article.

In the discussion of a paper by Messrs. Francis and Dennis, read before the American Society of Civil Engineers in 1906, the writer advanced the idea that the better progress possible in Europe was due to different labor conditions, a trained body of tunnel workers and better organization, rather than to differences in methods. Recent developments, both in this country and Europe, seem to confirm this impression.

The idea that the Brandt drills were responsible for the progress on the Simplon tunnel has been dissipated by the remarkable progress on the Loetschberg tunnel by percussion drills of a type similar to those generally used in this country.

F. LAVIS.

Contributed Papers.

TRAIN ACCIDENTS IN FEBRUARY.[1]

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of February, 1910. This record is intended to include usually only those accidents which result in fatal injury to a passenger or an employee or which are of special interest to operating officers. It is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation:

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	No. persons reported Kil'd.	Inj'd.
5.	Florida E. C.	S. Jacksonville.	rc.	P. & P.	1	3
7.	Chic., B. & Q.	De Soto, Wis.	bc.	P. & P.	0	4
8.	Southern	Waddy, Ky.	rc.	P. & Ft.	1	2
13.	Penn.	Munster.	rc.	Ft. & Ft.	1	3
†14.	Ga., S. & Fla.	Bonaire	bc.	P. & P.	8	8
16.	Illinois Cent.	Idlewild, Tenn.	bc.	Ft. & Ft.	1	3
17.	Penna.	Whitemarsh Jn.	xc.	Ft. & Ft.	1	2
19.	Wheeling & L.E.	Conners.	rc.	Ft. & Ft.	1	3
23.	Balt. & Ohio.	Greenspring.	xc.	Ft. & Ft.	1	2
23.	Bess. & Lake E'.	Shermansville.	xc.	P. & P.	0	1

Derailments.

Date.	Road.	Place.	Cause of derlmt.	Kind of train.	No. persons reported Kil'd.	Inj'd.
1.	Chic., Ind. & L.	Bennettsville.	unx.	Pass.	0	4
4.	Ill. Central.	Sardis, Miss.	unx.	Pass.	0	5
9.	Chic., R. I. & P.	Union, Mo.	unx.	Pass.	1	3
12.	Denver & R. G.	Woodside.	b. rail.	Pass.	0	7
*12.	M., & Int. Falls.	Walker.	unx.	Pass.	0	6
19.	Chic. & N. W.	Little Suamico	b. rail.	Pass.	0	14
20.	P., C. C. & St. L.	Scio.	unx.	Pass.	0	0
27.	Chic., M. & St. P.	Hastings.	b. rail.	Pass.	1	6
28.	L. S. & M. S.	Olmsted Falls.	b. truck.	Pass.	0	0

The collision at South Jacksonville, Fla., early in the afternoon of the 5th resulted in the complete wrecking of a Pullman car, but the car carried no passengers. Northbound passenger train No. 40, standing at the station, was run into at the rear by northbound passenger train No. 36, the "Oversea Limited" from Knights Key. The reports indicate that No. 36 came on at high speed, disregarding yard signals. The person killed was a trespasser. Two passenger cars were wrecked and the engine of No. 36 was slightly damaged. There were no passengers killed and only one injured. Two employees were slightly injured.

The butting collision of passenger trains near Bonaire, Ga., on the 14th, is reported as due to a mistake on the part of the men in charge of the northbound train. They had a despatcher's order to meet the southbound at Bonaire, but they ran past Bonaire without stopping. Both engines and the two leading cars of both trains were wrecked, and two passenger cars in the southbound train were badly damaged. The southbound was No. 5, the northbound No. 2, and both trains were well filled. They were running at full speed when they met. Three passengers and five trainmen were killed and 24 passengers and trainmen were injured.

The derailment at Union, Mo., on the 9th occurred just as the train was entering on a trestle bridge. The reports indicate that the cause was not discovered, but the tender was the first vehicle to jump the track. The reports say that the bridge is 75 ft. high and that the baggage car, mail car and two passenger cars fell to the bottom of the ravine. The conductor of the train was killed and three passengers were injured.

The train derailed at Scio, Ohio, on the 20th, by a broken rail, was No. 30, the eastbound 24-hour train from St. Louis to New York. Only the last four cars went off the track. The train was running at high speed, but the cars did not

[1] Abbreviations and marks used in Accident List:
rc, Rear collision——bc, Butting collision——xc, other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, unexplained——derail, open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc.——boiler, Explosion of boiler of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (includes empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

sustain severe damage, and of the 29 passengers on the train none was injured seriously enough to require surgical attention.

The derailment at Hastings, Minn., on the 27th, in which the baggageman was killed, occurred about a mile south of the station while the train was running about 35 miles an hour. The engine was not wholly derailed, but the tender, baggage car, express car and first four passenger cars fell down a 14-ft. bank. The breaking of the rail is ascribed to the intense cold.

The train derailed at Olmstead Falls, Ohio, on the 28th, about 3 a.m., was the westbound Twentieth Century Limited express, and, according to the reports, it was running at 60 miles an hour when the wheels left the track; yet only two or three persons were injured, and these but slightly. The train consisted of two engines and seven cars. The engines were not derailed, but all of the seven cars went off. The number of passengers on the train was about 80.

Of the 15 electric car accidents reported in the newspapers of the United States in February six are reported as resulting in fatal injuries, the total number of persons killed being eight. There were runaway cars at Dalton, Mass., and St. Louis, Mo., and street cars were struck by locomotives at Columbus, Ohio; Scranton, Pa., and Chicago. At El Paso, Tex., on the 20th, a car full of passengers was thrown into a panic by the controller box of the car taking fire, though there was no serious damage done to the car and no derailment; yet two of the passengers were killed in jumping off, and a third was injured.

THE WESTERN FREIGHT-RATE SITUATION.*

The commission reopened the Spokane case in the fall of 1909, and gave hearings at Salt Lake City, Spokane, Seattle, Portland, San Francisco and several other places. Never were the rates of any section sifted by a public body with such thoroughness, or attacked and defended with such skill, energy and resources. * * * The initial fallacy of the shippers is in the assumption that the railway will not voluntarily make any rates which will not cover all operating expenses and overhead charges. They make rates every day that do not cover all these things. The production of transportation, like the manufacture of several articles in the same factory, is an example of joint cost. The meat packer pays, perhaps, $7 per 100 lbs. for a steer. He makes a number of things from the carcass—steaks, roasts, etc.—and finally, from the residue, fertilizer. He does not sell 100 lbs. of each for the average cost per 100 lbs. of the steer, plus proportionate parts of the expense of operating his factory and of his overhead charges. He sells porterhouse steaks for a great deal more than this. He sells fertilizer for very much less. The manufacture of fertilizer adds something to the expenses of running his plant. If he gets for it something more than this *added* expense, he can say truly that he has derived a profit from it, although he may not receive for it one-tenth as much per 100 lbs. as he paid for the steer.

Now, the railway is in a situation precisely analogous to the packer. It does not make much difference in their total operating expenses whether they pull their cars to the coast empty or loaded. If they can load their cars to the coast with traffic that pays only a little more than the additional expense incurred by taking it, their net gains will be increased by that much. Now, the rates that they can get to the coast are strictly limited by the rates by water. If they are made much higher than the rates by water the coast shipper will bring his goods in by boat, because the rail charge will exceed the *value* to him of the rail service as compared with the water service. Theoretically, the rail rates might be made the same either by raising those to the coast or by reducing those to the interior. But, as a matter of fact, the charges to the coast cannot be raised without the sacrifice of a great deal of traffic. Water competition is no myth. The American-Hawaiian Steamship Company takes goods from New York across the Isthmus of Tehuantepec and lands them in San Francisco in 25 days. Last year all boats (not including tramp vessels) landed 266,000 tons of freight in California, while the Southern Pacific carried there of transcontinental traffic only 205,000 tons.

The logical application of the distance principle would be ruinous to the very communities that are contending for it. If, on principle, rates *into* this territory should be based on distance, then, on the same principle, rates *out* of it on its products ought to be based on distance. But both the Pacific coast and the interior West are very remote from the great markets of the East where they sell their fruit, vegetables, lumber, etc. To enable them to sell their products in these markets the railways have made much lower rates on them in proportion to distance than on similar commodities when produced farther east. To these low rates is largely due the present extraordinary prosperity of the West.

The roads concede that some changes should be made. It is to the interest of the entire nation, including the western railways, that the development of the rich natural resources of the interior West should be fostered in every practicable manner. The only way the railways could put and keep it on an actual parity of rates with the Pacific coast would be to get control of the water lines. Public opinion would not stand that.

Whether public authorities constitutionally may reduce the rates of a railway on the ground that its earnings are excessive is an open question. The decision of the Supreme Court of the United States which has the most direct bearing on the matter was in a case involving the constitutionality of an act of the legislature of Kansas reducing the rates of the Kansas City Stockyards Company. On the rates fixed by the company it was earning 11 per cent. On the rates fixed by the legislature it could have earned 5.3 per cent. It was contended that the legislature was justified in reducing the charges of the company because its profits were excessive. But the supreme court unanimously held otherwise. Justice Brewer, who wrote the opinion, said:

"The court has not held that the legislature may enforce rates that stop only this side of confiscation. * * * It has declared that the present value of the property is the basis by which the test of reasonableness is to be determined, although the actual cost is to be considered, and that the value of the services rendered to each individual is also to be considered. The question is always not, What does he (the person performing a public service) make as the aggregate of his profits? but, What is the value of the services which he renders to the one seeking and receiving such services? Of course, it may sometimes be * * * that the amount of aggregate profits may be a factor in considering the question of reasonableness of the charges, but it is only one factor, and is not that which finally determines the question of reasonableness."

It is contended by the railways that even if the public, through commissions or legislatures, has the *power* to so reduce the rates of railways as to limit their net earnings to the current rate of interest, it will not be economically expedient to exercise it.

The main cause of the large increase in net earnings since 1893 has been the reductions in operating expenses that have been effected by improvements in the railways' plants and in the methods of operating them. The main incentive to improve and reduce the expenses of existing railways and to build new lines will be removed if it shall become the policy

*From an article in *Scribner's Magazine*, by Samuel O. Dunn, Western Editorial Manager of the *Railway Age Gazette*.

of the government to appropriate for the benefit of those who furnish neither the money nor the brains for railway improvements and extensions all the net earnings above a certain low maximum. It is argued that so long as the rates of the railway do not discriminate or impose an undue burden on traffic it is entitled to earn at least the ordinary rate of commercial profit in the territory where it does business. It is contended that the prosperity which the West is enjoying shows that the rates of the railways as a whole lay no undue burden on its commerce. It is shown that the average annual profits of the very jobbers who most complain are, according to their own testimony, from 15 to 20 per cent. per annum. It is argued that in view of these facts, there is no justification for sweeping reductions in freight rates.

WORK OF THE BUREAU OF EXPLOSIVES.

Following is a summary of the routine work done during the year 1909 by the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, taken from the annual report of Chief Inspector B. W. Dunn, 24 Park place, New York.

	1909.	1908.
Total No. railway lines members of Bureau Dec. 31st	172	158
Total mileage of Bureau lines December 31st	209,984	202,186
Total No. of inspections of stations for explosives	6.953	5,603
No. stations receiving two or more inspections for explosives	1,839	1,309
Total No. inspections of stations for inflammables	6,950	*1,098
No. stations receiving two or more inspections for inflammables	1,886	.....
Total No. of inspections of factories	278	270
No. of factories receiving two or more inspections	75	69
Total No. of inspections of magazines	1,293	1,540
No. magazines receiving two or more inspections	349	361
Total No. boxes of high explosives condemned as unsafe for transportation	*10,029*	*4,852*
Total No. kegs of black powder condemned as unsafe for transportation	*1,468*	*531*
Total No. cars in transit containing explosives inspected	475	448
Total No. cars in transit showing serious violations of the regulations	168	197
Total No. inspections of steamship companies' piers (inflammable, 75; explosive, 63)	138	.....
Total No. of inspections made by Bureau	16,087	8,959
Total No. of lectures to railway officials and employees and meetings addressed on the subject of safe transportation of explosives and other dangerous articles	215	171
	1909.†	1908.	1907.
Total No. accidents resulting in explosions or fires in transportation of explosives by rail	12	22	79
Total known property loss account explosions or accidents in transporting *explosives* by rail	$2,673	$114,629	$496,820
Total No. persons injured by explosions in transit	7	53	80
Total No. persons killed by explosions in transit	6	26	52

During the same period reports have been rendered to the chief inspector by the Chemical Laboratory of the Bureau on 734 samples, as follows:

Explosives	211
Fireworks	186
Inflammables	304
Paper for lining high explosive boxes	31
Ammunition	2
Total	734

* October 15, 1908, to January 1, 1909.
† On Bureau lines, 3 persons injured and 2 persons killed; property loss, $1,173. On mine railway, not a member of the Bureau, 2 persons injured, 4 persons killed; property loss, $1,500.

REID-RAMSEY STEAM TURBINE ELECTRIC LOCOMOTIVE.

The Reid-Ramsey steam turbine electric locomotive, being built at the works of the North British Locomotive Company, was recently described by Hugh Reid before the Glasgow University Engineering Society. This locomotive is a development of the old Heilmann steam electric locomotive which received so much attention in English and Continental electrical circles in 1894, though it is on a different and more practical basis. The steam is generated in an ordinary locomotive type boiler fitted with a superheater. Coal and water supplies are carried in the side bunkers and there are water tanks at both sides of the boiler. The steam is led to a turbine of the impulse type, operating at a speed of 3,000 revolutions per minute, to which is direct coupled a continuous-current variable voltage dynamo or generator. The dynamo supplies electrical current at from 200 to 600 volts to four series-wound traction motors, the armatures of which are built on the four main or driving axles of the locomotive.

The exhaust steam from the turbine passes into an ejector condenser, and is, together with the circulating condensing water, delivered eventually to the hot well. The water of condensation being free from oil is returned direct to the boiler by a feed pump; the water carried in the tanks is used for condensation purposes. It is circulated by means of small centrifugal pumps driven by auxiliary steam turbines placed alongside the main turbine and dynamo. The cooler is situated in front of the locomotive, where the full benefit of the blast of air caused by the movement of the locomotive, aided by a fan, is utilized. The condensation of the exhaust steam deprives the locomotive boiler of the usual exhaust blast and forced draft is provided by means of a small turbine-driven fan, placed within the cooler, so that it will deliver hot air to the fire and at the same time assist the current of air through the cooler.

On the driver's platform, within easy reach, are the small switchboard and instruments, the controller for grouping the four motors in series, series parallel and parallel, according to the drawbar pull to be exerted, and the regulator for controlling the voltage in the electrical circuit and consequently the speed of the train. These are all mounted on a strong underframe, which is carried upon two eight-wheel trucks so constructed that they will easily negotiate curves. Each truck carries two of the four motors. Mr. Reid stated that the experiment was being carried out at heavy expense and on a large scale. The engine is intended for express passenger main line work, and it is hoped to obtain comparisons with the performances of the reciprocating steam locomotives, especially as regards relative consumption of fuel and water, and as to the efficiency of transforming the energy of steam into drawbar or train pull and also the relative rapidity of acceleration.

FOREIGN RAILWAY NOTES.

The minister of public works of Panama is soon to ask bids for building a railway from Panama to David, 200 miles; also from Panama to Los Santos, and from David to Bocas del Toro.

The French railways as a whole earned gross $10,564 per mile in 1893, $11,513 in 1898, $11,925 in 1903, $12,865 in 1906, and $13,516 in 1909. The working expenses have varied between 53 and 57½ per cent., the latter in 1908—the last year reported.

At a meeting of promoters held at Nagoya, Japan, it was decided to organize a company with $1,000,000 gold capital for building a 21-mile electric tramway from Temma Cho, Atsuta, the terminus of the Nagoya line, to Tokoname Cho, Chita district. This scheme, if carried out, will undoubtedly present an opportunity for the sale of a considerable quantity of American electrical and railway supplies.

An agreement has been made by Le Roy Ferry, of New York, on behalf of the Honduras National Railroad, with a London syndicate to provide money for the completion of this road from Truxillo, on the Atlantic Coast, to Tegucigalpa, the capital of Honduras, 350 miles. The mountains on the west are thought to prohibit an extension to the Pacific Coast. The company is an Arizona corporation with $10,000,000 authorized stock, and $5,000,000 first mortgage 30-year 6 per cent. bonds authorized. The track is to be standard gage, laid with 70-lb. rails.

THE NEED OF UNIFORM RAILWAY TAXATION.

BY CHARLES HANSEL.

The railway companies cannot hope for satisfactory and reasonably uniform tax laws until they themselves are prepared to offer a plan; and it does not seem practicable for them to do so before they have worked out independent plans on the lines of the several theories of value and tested them thoroughly so as to be sure that they have obtained a workable, understandable and fair solution of the question.

A study of the railway tax laws of the various states demonstrates the wide difference in principles and results and illustrates the great difficulty of writing a statute which is comprehensive in all its details, and, perhaps, the vagaries of the tax laws are not occasioned so much by the ignorance or unfairness of the legislators as by the difficulty of arriving at the proper method of determining value, having in mind the various "true values" of the railway and the apportionment of value into states and minor civil divisions. It is, however, very difficult to formulate the remedy, and, although railway officers generally have reason to complain of the various theories of taxation adopted in the several states, it does not appear that they are prepared to offer a complete plan which would be fairly just to all concerned and which they would willingly see incorporated in the statutes of all the states.

The primitive systems employed in earlier years have given way to special enactments. Taxation based on gross earnings or gross receipts has been, generally, superseded by ad valorem of some form of specific taxation; and, in 32 states and the District of Columbia we find a general property tax based on the value (?) of real and personal property; and, with some qualifications, several other states might be included; and, indeed, all the states have some form of ad valorem or specific taxation. It appears, therefore, that the trend of change is toward ad valorem or property value and this, of course, involves the valuation of the physical property; and, perhaps, in addition thereto, the non-physical, adventitious, intangible, franchise or unearned increment elements.

The state boundaries and minor civil divisions or taxing districts of the state present obstacles which seem difficult to overcome, and this is fully appreciated by interstate railways, which face a different system of taxation in each of the various states traversed and are compelled to spend a considerable sum of money each year to finally determine and adjust the payment of taxes in each of the states and the several minor divisions in which they operate.

Since the term "Value" is not generical or definite, it is necessary to dfine the term for the purposes to which the valuation applies. From the point of view of the traveler or shipper, who is personally interested in arriving at his destination or in feeling assured that his shipment will arrive with considerable certainty, the value of a railway lies in its continuity, and not in the aggregate cost or value of its many parts. From this point of view there is no difference in value between any two parts of a railway for the reason that it requires all of the various departments and a continuous track to perform the service for which he has paid. The state or taxing district cannot accept this broad equalization of value for the purposes of taxation.

The general balance sheet of a railway may properly record the money expended to acquire the property, although, as in the case of right of way, terminal grounds and the like, the cost of acquiring land is generally far more than the going price of contiguous or adjacent land. Improvements in alinement or grade, causing abandonment of old roadbed and right of way, may be, from one point of view, properly chargeable to asset account in the book values. It might be advisable, however, to segregate these abandoned properties into the amortization fund to justify the original bond issue. Such improvements may, and generally do, require the sale of fresh shares, especially when the cost is large, thereby adding to the capital account although the mileage may be shortened. While the capital account is then increased, it is expected that the saving in operation will yield an increased net revenue which will warrant the expenditure. Under such conditions the current appraisal of physical elements would eliminate such abandoned portions of the roadbed; consequently, the current appraisal of physical property might fall below the sum indicated on the balance sheet as the true cost of the property. In the opinion of a number of influential railway men, "Cost of Construction," as shown by the general balance sheet is the best available measure of the value of railways. It is doubtful, however, if they would be willing to be taxed on value established in such manner.

Any system of inventorying and appraising the physical property, as well as the purposes of the valuation, must be clearly defined, and, in order to avoid confusion and misinterpretation, it is necessary to prepare a glossary of terms and arbitrary definitions of words as applied to the particular scheme of valuation, as well as a standard of measurement or template to be applied to each of the various important classes of property involved in a railway.

The method of fixing depreciation in all the various departments of railway service is to-day undetermined, and any tax law based on physical value must consider depreciation in order to establish present value. Consequently, it is necessary to formulate some rule of depreciation in each of the several departments.

It is, perhaps, impossible for the finite mind to determine the value of any element apart from the purposes of its use and many items of great cost to the railway are only valuable to the specific purposes they fulfil. It is practicable, however, to establish a physical value if arbitrary definitions are given and detailed rules of measurement laid down.

It cannot be expected that there will ever be a uniform system of railway taxation in all the states, but it may be practicable to secure uniformity in the majority of the states if the American Railway Association can suggest a reasonable and workable method of railway taxation. The best results would probably be accomplished by the organization of a special bureau on railway taxation, the members of which should devote their entire time to the study of all the problems attendant upon this profound question. After having compiled their studies, they would be in a position to prepare several definite, detailed bills based upon each of the several theories of taxation, such as commercial value, gross earnings, cost of constructing, intangible assets, market value of securities, etc.; and, when tney have prepared these bills and a complete glossary of terms to accompany same, they could test out the several plans on some one railway property and report the results obtained under each of the several plans. In the application of the plans, errors and omissions would develop which, of course, could be corrected and adjusted before the final results were determined. After these final results had been determined by the bureau the whole matter could be laid before the Railway Association in an intelligent and comprehensive manner. The association would then be in a position to offer a plan for railway taxation which it believed was fair and workable.

The public, generally, has a high regard for the ability and integrity of purpose of the railway officers of the country, and the governors of the several states would, no doubt, respond to an invitation from the American Railway Association to send representatives from each of the states to meet in convention for the purpose of considering a comprehensive, workable tax law, and, even though many changes might be suggested, the result would be a majority opinion favoring some definite form of taxation. The railway officials are not, perhaps, so greatly interested in any particular theory of taxation, providing it is reasonably fair, as they are in securing

uniform taxation throughout the land, practicably eliminating state boundaries and minor civil divisions.

The writer has served as a member of two commissions in the appraisal of railway property, the purpose of appraisal in one state being to establish principles of determining value, which are to be the basis of a new statute entirely different from the existing law; the purpose of the appraisal in the other state was to fix the "True Value" of all the railway property separately from the value of franchise, and in form available for the assessment of taxes under existing laws which required the interpretation of the laws and disclosed the defects. In the first instance we were called upon to evolve detailed methods of appraisal to conform to a predetermined theory of taxation; in the other case, we had to apply the law—which was not broad enough nor narrow enough to insure comprehensive certainty.

There must be some method of railway taxation which is reasonably correct and understandable. It is not likely, however, that satisfactory progress will be made toward uniformity or practicability unless the matter is made the particular business of the railways.

CULLYBACKEY INTERLOCKING AND TYER'S TABLET.

The drawings and photographs reproduced herewith illustrate the signaling at a typical station on a single-track railway in Ireland—Cullybackey, on the Midland Railway, leading from Belfast to Portrush and Derry. This is a double-track line for 33 miles from Belfast and single-track for the remainder of its length. On this portion of the line there are in winter 16 scheduled trains between the hours of 8 a.m. and 8 p.m., but in summer this number is almost doubled by pleasure parties and other specials. The average scheduled speed is 40 miles an hour for express trains and 30 for

Station Building and Platform; Signals 5 and 10.

stopping trains. The blocks are from three to five miles long. For about an hour morning and evening the line is used almost to its full capacity. The double-track at the station is of sufficient length to accommodate the average freight train, and there are separate interlockings at each end of the station.

The interlocking machines are lever-locked, having a horizontal locking frame under the floor. Lazy-jack compensators are used in the pipe lines and there are adjustable crank connections to the functions. The facing point or switch lock is fastened to the tie plate between the rails and has a flat-shaped plunger. A wooden covering protects the lock and its connections against injury. As elsewhere in Great Britain left-hand running is the rule of the road, and all signals are placed left-handed to the tracks. Signals 2-14 and 5 are the starting or block signals, signal 10 is for shunting purposes and 7 is the advance starting signal for trains running toward Derry.

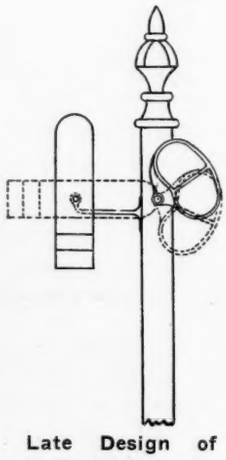
To provide joint control of the up and down main line switch signals between the two signalmen mechanical slots are used, the slot being fixed on the signal post except in the case of the distant signals, where they are fixed on a ground stand near the home signal. All signals are worked by single wires—stranded cables. The slotted signals are indicated on the track diagram by the double blades. The numbers on the blades shown in the stop position refer to the lever in the cabin adjacent to the switch.

All signals are bolt locked on the facing points which they protect. Bracket signals are used at diverging routes, the higher post being for the main route. Siding signals are distinguished by a ring placed on the blade. The highway

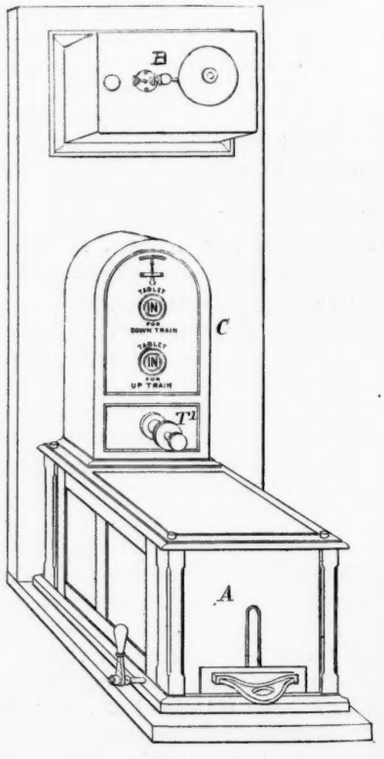
Cullybackey Station; Midland Railway of Ireland.

(Continued on following page.)

gates at the grade crossing are locked from the down signal cabin in such a manner as to prevent the clearing of a signal for a movement over the crossing until the gates are opened to the track and closed to the highway. A track diagram and manipulation chart is provided in each cabin and in addition the number plates on the levers are provided with a lower extension, giving the order in which the levers of any particular route must be moved. In the later type of sig-



Late Design of Semaphore.



Tablet Case.

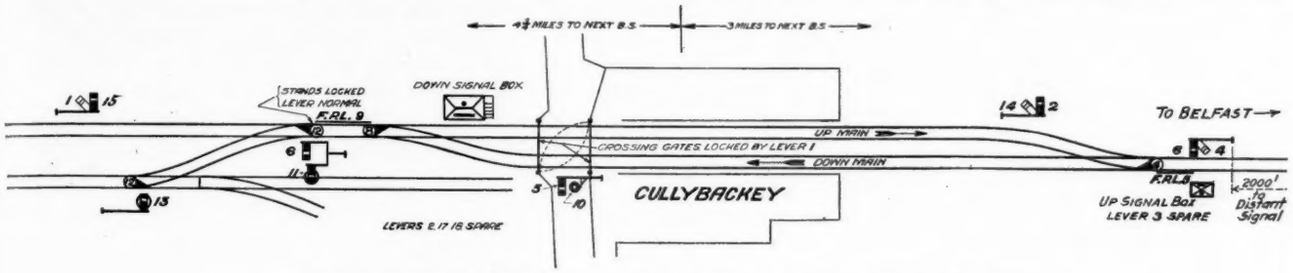
nals the blade and the spectacle casting are independent of each other and are mounted each on a separate axis. The blade, when cleared, assumes the vertical position, about 18 in. away from the signal post as shown. Distant signals are located about 2,000 ft. in rear of the first home signal. Detector bars are made of angle iron and have a link connection to the rail.

TYER'S TABLET APPARATUS.

Trains on this line are controlled by the controlled manual absolute block system, Tyer's train tablet apparatus being used. This apparatus works on the same principle as the electric train staff. Briefly described, the block instrument

consists essentially of a slide by means of which tablets are inserted in or withdrawn from a magazine cylinder, D, placed vertically. The slide can be withdrawn empty at any time by means of handle D5, but is mechanically locked by the commutator whether normal or reversed (in or out) against issuing a tablet.

The handle, D-5, lifts lever D-4, and raises the tablets out of the recess and releases the lock on the slide; but it is mechanically locked when in or out (which may be considered the normal or reversed position), against issuing a tablet by the dogs E-2 and e. Either one of these dogs is released by the downward movement of the rods d-4 and e-I which are attached to the disk, T-2, mounted on the same axis as the commutator, T-I, in front of the instrument. One of the rods, d-4 and e-I, stands normally locked by the armatures, e-2 and d-5, of the lock magnets. The commutator, T-I, operates the pole changer. When both instruments are normal and the plunger, T-4, is pressed, a current is sent to the instrument receiving the unlock, operating the polarized relay in the proper direction to release the normal lock. This enables the commutator, T-I, to be turned, when it becomes locked by the reverse lock. The turning of the commutator lowers rod d-4, which raises dog E-2 from engagement with the slide, enabling the slide to be withdrawn with a tablet. The slide cannot now be fully restored owing to dog e being free to engage in a groove in it.

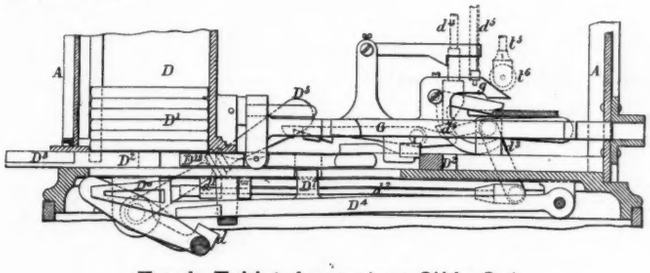


Arrangements of Signals at Cullybackey, Ireland; Midland Railway.

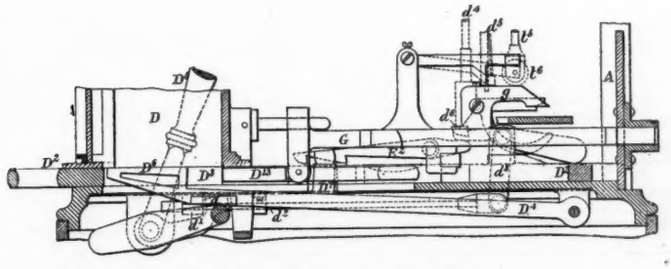
(Continued from preceding page.)

Signals 6 and 11; Switch 8.

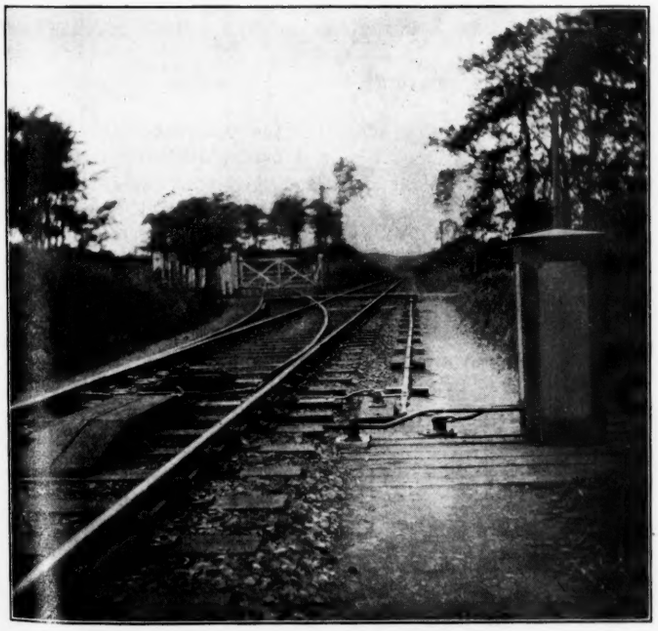
Tablet Exchanging Apparatus.



Tyer's Tablet Apparatus; Slide Out.



Tablet Apparatus; Slide in.



Outlying Switch at Dromona Siding Controlled by Tablet.

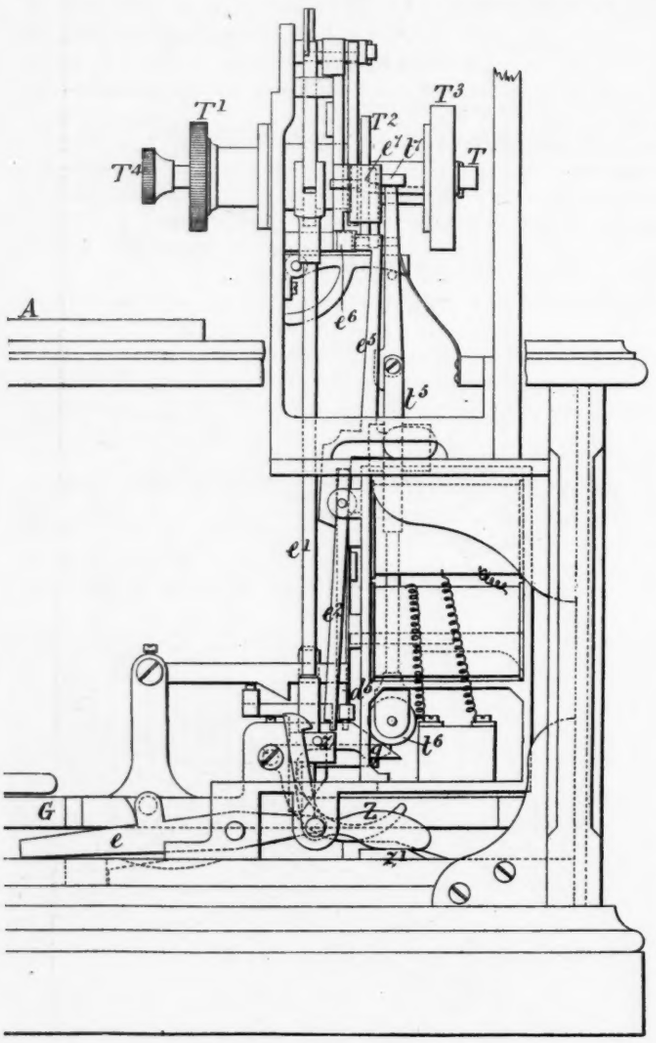
When a tablet has been carried by a train to the unlocking station the slide is withdrawn empty and the tablet inserted. This enables the slide to be pushed all the way in, when it temporarily reverses the commutator by means of rod t-5 so that if plunger T-4 is now pressed a current will be sent to the issuing instrument releasing the reverse lock on the commutator there; and when this is restored it mechanically releases the reverse lock on the slide by means of rod e-I acting downwards on dog e, enabling the slide to be pushed home; and then the apparatus becomes normal again for further operation.

The block instruments also include bell signaling and indicators to show the state of the block, and there are a number of special devices to make it proof against improper use. The entire apparatus, including bells and telephone, is operated with one line wire—a galvanized iron wire with ground return.

A tablet exchanging apparatus shown is used for non-

stopping trains. The tablet, protected by a leather pouch, is placed in the catcher. The catcher on the engine is similar to the one on the ground stand, and these are brought into alinement when the exchange is to be made.

The block instruments are situated in the station master's office, who takes charge of them. No control is used between the semaphore signal and the block instrument; the rules of the operating department being depended on to insure safety in this connection. When the station master has delivered a tablet to a train he notifies the signal man in the



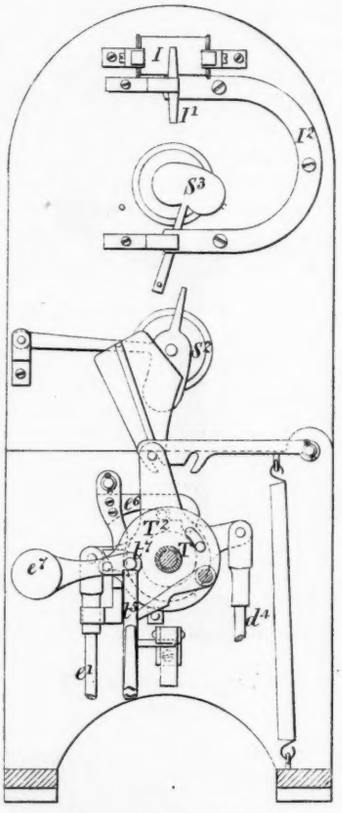
Tablet Apparatus; Side View.

cabin to clear the starting signal. The engineman must not pass the block or starting signal at stop, and he must not proceed into the next block without having in his possession the tablet for that section.

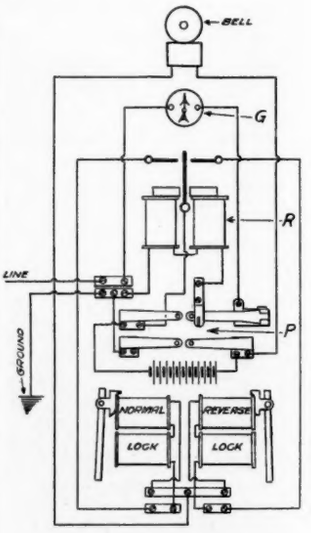
Rule 409 provides for cases where two trains approach from opposite directions at the same time and reads as follows: "(a) When trains which have to cross [meet] each other are approaching a tablet station, in opposite directions, the signals in both directions must be kept at danger, and when the train which has to be first admitted into the station has been brought nearly to a stand, the home signal applicable to such train may be lowered to allow it to draw forward to the station or to the starting signal, and after it has again come to a stand and the signalman has seen that the line on which the other train will arrive is quite clear, the necessary signals for that train may also be lowered." Other special rules deal with the safe handling of trains when the section head is not clear beyond the first home signal at the next block station.

The outlying switch at Dromona Siding shown, is controlled by the tablet for the section in which it is located. A two-lever dwarf machine is housed in a cast-iron box at the switch; one lever operates the switch and derail, and the other operates the switch lock. When the levers are reversed they come into a plane outside the door of the box, hence the door cannot be shut unless the levers are normal. To open the door the tablet is placed in a slide at the top and the tablet cannot be withdrawn from the slide until the door is closed again. This arrangement effectively interlocks the switch with the block instrument, and the switch is also locked by a splice bar bolt which screws the switch point and stock rail together. The switch is not used more than twice a day, and as there is an attendant on hand, this latter feature does not seem to cause any inconvenience.

In cases where an engine assists a train in the rear partially through a block section, where the Tyer apparatus is



Commutator Details.



Circuits for Tyer Tablet Apparatus.

G—*Galvanometer.*
R—*Polarized Relay.*
P—*Polechanger.*

in use, a banking staff is handed to the assisting engine. This has the form of a large key and controls the electric locks on the tablet instrument in such a way that the instrument cannot be restored normal until the banking staff is replaced.

DOUBLE TRACK IN MAINE.

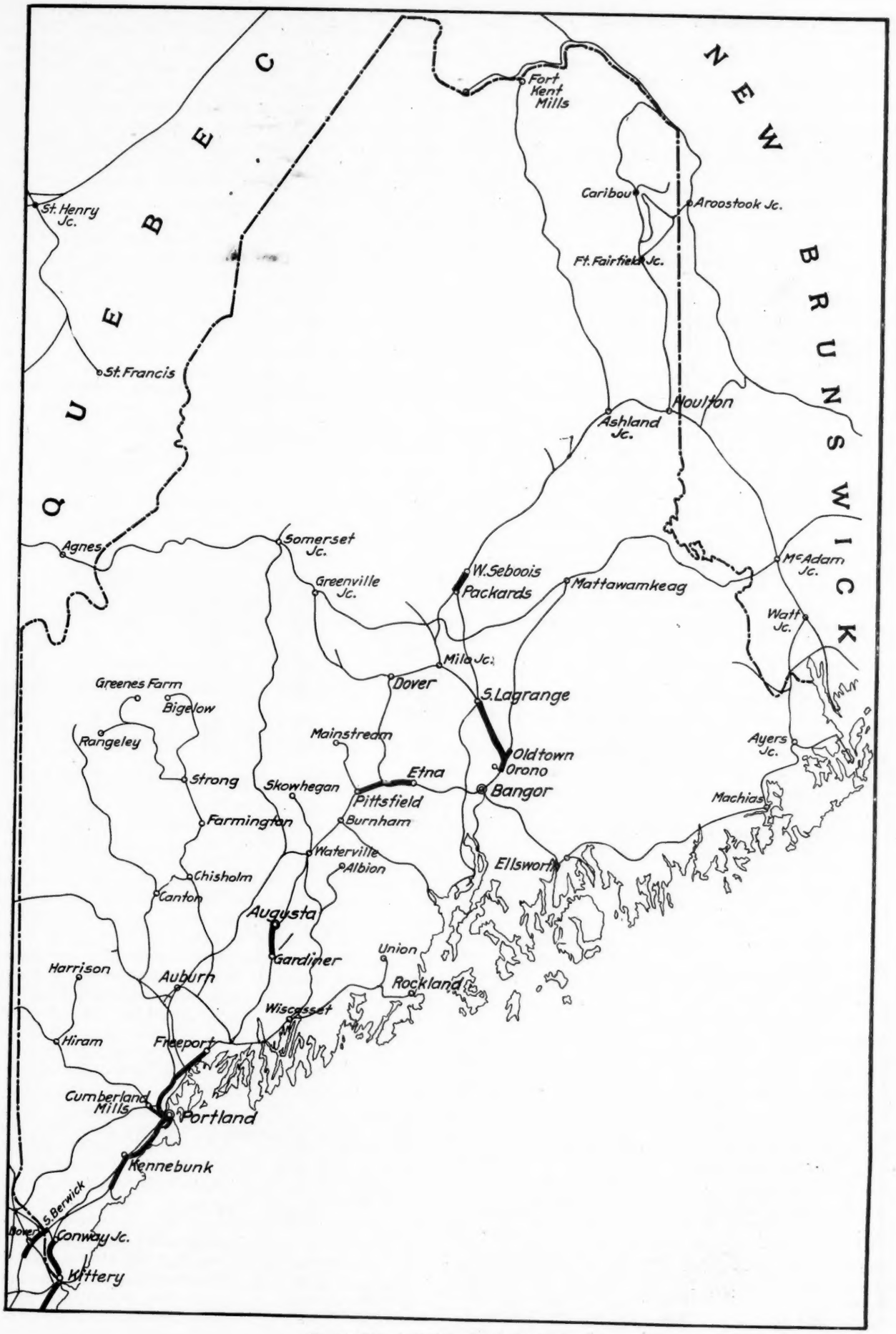
The map of the state of Maine, published herewith, has been made for the purpose of showing the location of all those pieces of railway in the state which have more than one main track. All railways in the state not here shown in heavy lines are single-track. The termini of the double-track sections are as follows:

Bangor & Aroostook.
Northern Maine Junction-S. Lagrange.
West Sebois-Packards.

Boston & Maine.
Kittery-Conway Junction.
Portland (1.77 miles).
Kennebunk-Portland, Western division.

Maine Central.
Portland-Freeport.
Gardiner-Augusta.
Pittsfield-Etna.
Orono-Oldtown.
Portland-Cumberland Mills.

Maps of other states are to follow.



Double-Track Railways in Maine.

SUBAQUEOUS TUNNELS.

BY R. B. WOODWORTH,
Engineer with the Carnegie Steel Company, Pittsburgh, Pa.

III.

The soft ground tunnel constructed with a side shield shades insensibly into the subaqueous tunnel, and indeed, so far as modern practice indicates, the chief difference between a soft ground tunnel through heavy water bearing strata and a subaqueous tunnel in soft material is the feature of hydrostatic head and the necessity for the employment of compressed air at high pressure, not as a matter of expediency and to avoid possible difficulties, but as a matter of necessity in view of conditions always present. The hydrostatic pressure increases with the diameter of the tunnel and is always greater at the bottom than it is at the top and its action needs very careful attention in tunnel design and in tunnel driving.

In the construction of subaqueous tunnels the thing chiefly to be desired is to get the roof of the tunnel as high as possible and its depth below mean low water is usually fixed by the harbor regulations which apply in the particular locality where the tunnel is built; as for example, in New York City the harbor regulations require a minimum depth of 40 ft. from mean low water to the top of the structure. The higher the roof of the tunnel can be made, the slighter are the grades necessary in approaches and the smaller, as a rule, the expenses of construction, it being sometimes possible to remove a large portion of the material by dredging methods rather than by mining. A smaller depth of water over the tunnel also means a lesser hydrostatic head and consequently a thinner tunnel lining. The danger in having the roof of the tunnel too close to the stream bottom arises from the usual treacherous character of the material, as blowouts may occur during its construction and the tunnel be drowned out entirely. These blowouts may take place through rock fissures or in soft material bodily throughout the entire mass.

The character of the material in the bottom of the stream has, therefore, a large bearing upon methods of subaqueous construction, and subaqueous tunnels may be classified in accordance with the methods which have been taken to overcome unstable conditions into three classes, which are:

1. The Closed Caisson and Excavating Method.
2. The Closed Caisson and Dredging Method.
3. The Shield Method.

With the first two of these it is not necessary at all that the material in the river bottom should be firm or that the tunnel bed should be below the bottom of the stream more than a sufficient distance to insure a firm foundation. Under the shield method the tunnel must either penetrate firm strata below the river bottom or else an air proof blanket be deposited over its entire extent.

CLOSED CAISSON AND EXCAVATING METHOD.

The Harlem River tunnel of the New York subway system, built in 1903, passes under the Harlem river through mud, silt and sand, the latter flowing with remarkable ease when wet. Between bulkhead lines the river, 26 ft. deep, is 400 ft. wide, but for 610 ft. the tunnel is made of two cast iron cylinders imbedded in concrete. D. D. McBean, of the subcontracting firm of McMullen & McBean, devised the following plan for its construction:

He proposed to inclose the space to be occupied by the tunnel by two lines of specially constructed 12-in. tight sheet piling. Upon these lines of piling cut to the proper level he would lay a timber roof of three layers of 12-in. x 12-in. timbers separated by courses of 2-in. plank running at right angles, making the roof 40 in. thick. Under the protection of the box so made he proposed to excavate the material either with or without the use of compressed air.

In the execution of this plan the river was first dredged so as to leave an average depth of 7 or 8 ft. of material to be removed. Four rows of piles were driven 6 ft. 4 in. apart, center to center transversely, and 8 ft. 4 in. apart longitudinally. They were cut off and capped to support the heavy timber roof and the interior bracing system and eventually were to be cut off at sub-grade to further support the finished tunnel. A line of 12-in. x 12-in. sheet piling was then driven along each side of the tunnel in careful alinement guided by a floating wale frame, steel pilot piles being further used to secure accuracy in driving. With the sheeting in place, the 40-in. thick timber roof, supported on six lines of 12-in. x 14-in. range timbers bolted to their bottoms, was floated into position, and when it was sunk these timbers rested exactly upon the two rows of sheet piling and the four inner rows of round piles. The sunken roof was next overlaid with about 5 ft. of earth dredged from the immediate vicinity to bring it to a firm bearing and to provide weight against the uplifting tendency of the air pressure. Each end of the box so formed was closed by suitable bulkheads, making the length of the timber 216 ft., or about half the width of the river, the other half being left open for navigation. When the water was driven from the working chamber formed within the box by compressed air, the leakage was found to be small and the sheeting in excellent alinement. The material inside was excavated with little trouble and the tunnel lined and concreted.

For the building of the second half of the tunnel Mr. McBean was convinced that a more economical form of construction could be devised by the substitution of the upper half of the tunnel itself for the heavy timber roof, especially as the timber roof had no function to perform after the completion of the tunnel. Fig. 7 shows the method by which the second half of the tunnel was constructed. The system of tunnel excavation after this method has been covered by letters patent. As before the site was dredged to nearly subgrade and a double line of 12-in. x 12-in. sheeting driven to form the sides and ends of the submerged box, but the sheeting was now cut off at the springing line of the tunnel to form a footing for the roof, which was built in three sections, two 90 ft. long and one 84 ft. long, in a floating box 106 ft. long, 35 ft. wide and 12 ft. deep. The bottom of this box was made of 12-in. x 12-in. transverse timbers laid 4 ft. apart and floored with 3-in. x 12-in. plank. On three 4-in. x 12-in. longitudinal timbers fastened to the floor of this box was then built a false floor for the upper half of the tunnel made of 16-in. x 16-in. transverse timbers 8 ft. apart carrying a center longitudinal sill of 10-in. x 16-in. timber and two side sills of 16-in. x 16-in. timber 6 ft. 3 in. from the center line. The space between these longitudinals was floored with 2-in. plank. Upon this false floor the cast iron tunnel was erected in 6-ft. rings. Rods and braces were introduced as a precaution against any possible deformation, and suspension bars were built through special cast iron and plate brackets. The roof was then covered with concrete tied together by imbedded reinforcing rods as a further precaution. Each 6-ft. ring of the iron shell weighed about 41,000 lbs. and carried 618 cu. ft. of concrete. It was estimated that the total weight

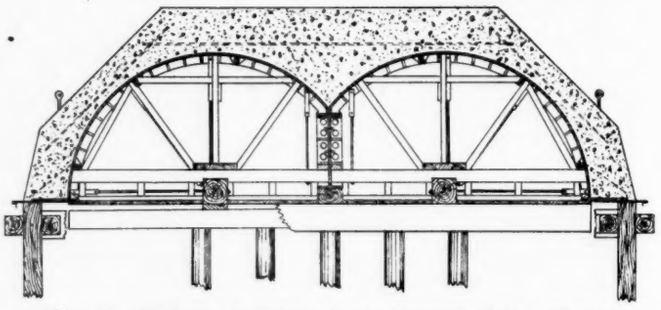


Fig. 7—McBean Construction; Harlem River Tunnel.

of the iron, concrete floor, etc., was about 50 lbs. per lineal foot less than the estimated buoyancy of the empty roof chamber. When everything was ready derrick boats were run along the side of the roof, the needle beams, floor, etc., lifted, the submerged box floated out from underneath and the roof lowered into its final position. At convenient intervals in the roof openings had been left for the descent of the workmen and for the removal of material. The excavation went on underneath the roof, which, with the lines of piling, formed a waterproof working space for the workmen. After the excavation had been completed under compressed air the interior of the tunnel was lined with concrete, the end bulkheads, surplus wood, etc., removed, leaving a reinforced concrete tunnel tube. The entire work was completed under the very low air pressure of 10 lbs. per square inch.

In this system of tunnel construction any shape desired may be given to the cross-section, also any combination of metal tubes and concrete, either plain or reinforced, can be employed. A twin double-track tunnel may be built as readily as a single tube, and such a double-track tunnel built as a single tube would possess materially increased rigidity and resistance to vibration under passing trains. This system also permits a much more rapid rate of working than is possible with other methods and provides ample opportunity for any kind of foundation desired underneath the structure.

One of the advantages of this method of construction is the excessive weight of the cast iron tunnel segments which have to sustain, in this method of construction, tensile stresses for which they are not perfectly adapted and which require, therefore, an excess weight of material. To obviate these tensile stresses to some degree it is necessary that the false floor be made exceedingly heavy. In addition the design of the section for a double-track tunnel is such as to entail a considerable excess of concrete. To obviate these disadvantages and to utilize as well the known advantages of steel in all classes of building construction the design shown in Fig. 8 has been proposed by the Carnegie Steel Company. This design is for the construction of a subway boulevard 60 ft. wide, having a central column adjacent to which run two street car tracks separated from the roadways by ornamental railing. This tunnel can be constructed after the McBean system of driving wooden side sheeting, or steel sheet piling, building the steel and concrete roof on pontoons and floating into position. Excavation can then be made in perfect safety and convenience under the roof, which is connected by a water-proof metallic seal to the sheet piling. The foundation for the tunnel will be constructed on round timber piles driven with floating equipment at convenient intervals across the tunnel site. The center piles should be longer than the others in order to allow the crown of the tunnel roof to rest upon them during construction. The steel work is figured for vertical stresses only; horizontal stresses will pass through the concrete and be resisted thereby. Girders would be shipped in two pieces and in erection would be riveted together over the columns and to the 18-in. distributing beams at their ends. They will then be assembled in sections and fastened together by chains from one end of one girder to the opposite end of the next so as to prevent separating when lowered into position. These chains are figured for about 88,000 lbs. thrust in the girder and are to be connected by clevises to 1-in. plates between the girders and the distributing beams. This will cause the girders to act as arches during erection. After the sections are lowered into their position and the working chamber opened it will be desirable to excavate the center portion to put in grillage and columns before the side portions are removed. In order to cut down the amount of concrete required it is placed after the manner of floor arches in buildings. The estimated weight of the steel required, including the columns, the girders, the grillage, etc., is 7,900 lbs. per running foot.

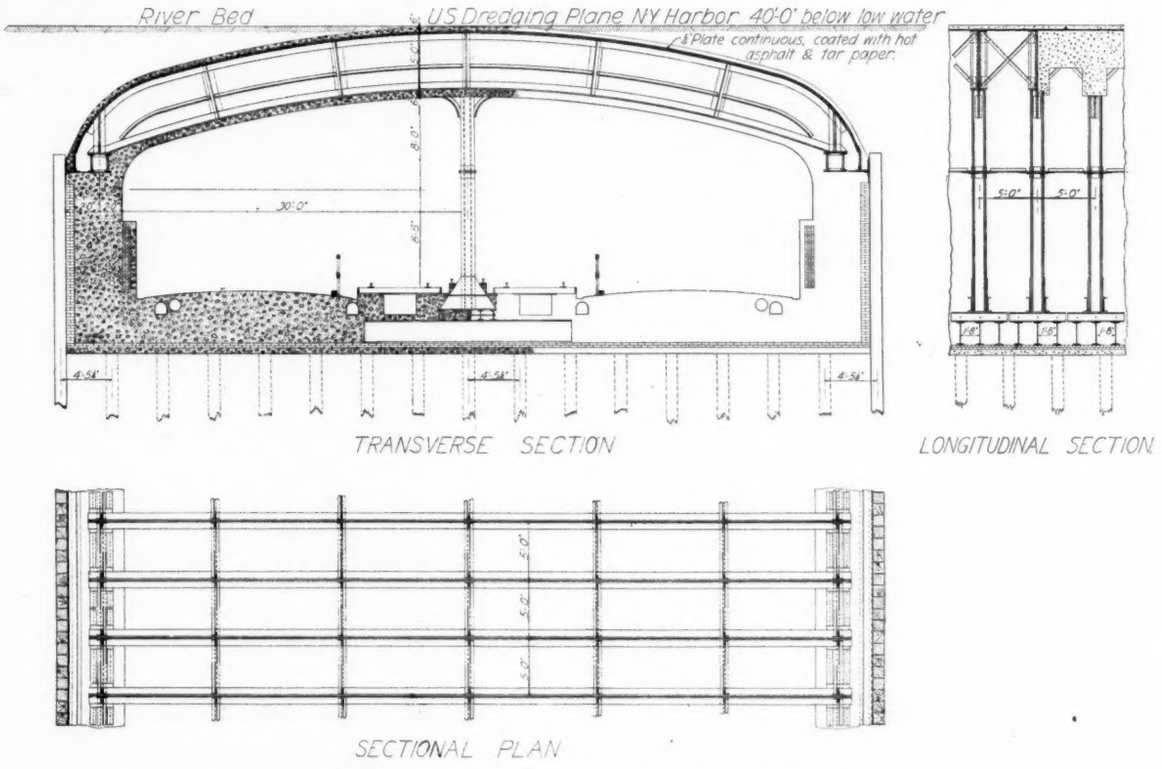


Fig. 8—Tunnel for Roadways; McBean System.

CLOSED CAISSON AND DREDGING METHOD.

A somewhat similar method of construction has been followed in the tunnel crossing under the Seine river by Line No. 4 of the Metropolitan Railway, of Paris. The total length of the tunnel is 3,584 ft., of which 2,038 ft. were driven by the shield method, 1,320 ft. by the submerged caisson and 226 ft. by the freezing process. The tunnel is lined with cast iron segments and the same method of lining pertains through the

shield driven tunnels, the length built by the freezing process and that built by the caisson method. Three caissons, as shown in Fig. 9, were sunk end to end to form the crossing of the main stream, two others to form the crossing of a smaller branch, while three were sunk to form each of the two stations.

The three river caissons were 118, 126 and 142 ft. long, respectively, and the two caissons for the smaller crossing were each 66 ft. long. The caissons were made of structural steel ribs braced together by longitudinal framework consisting of heavy I-beams and short members made of steel angles. The frames were continued below the elevation of the floor to form the working chamber beneath the caisson. The entire frame-

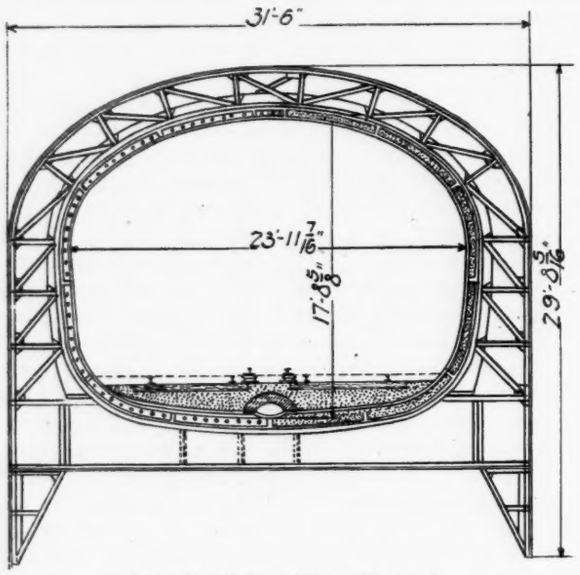


Fig. 9—Seine River Tunnel.

work, including the ends, was covered with steel plates so that when finished the caissons had flat sides and ends and an elliptical top. After erection the caissons were launched and towed into position between pile stagings, which served the double purpose of guiding their descent and forming a working platform. Previous to this sinking the portion of the river bed to be occupied by the caisson had been leveled by dredging. Once in position the cast iron segments were erected within the framework and the annular space between the lining and the shell filled with concrete, gradually sinking the caisson to the river bottom. As the sinking progressed the working shafts were placed in position, air pressure applied and the excavation proceeded with underneath the cutting edge of the caisson. No special difficulty was experienced in sinking the caisson aside from the hardness of the material which had to be broken up by blasting. A space was left between the successive caissons of about 5 ft. and it was proposed to close this space by building in a section of lining and steel envelope.

A similar method was followed in the construction of the subaqueous portion of the Detroit river tunnel, of the Michigan Central, 2,622½ ft. in length. The construction adopted was to build the entire length in ten sections of riveted twin tubes 23 ft. 4 in. in diameter built on shore, floated into position and sunk with the aid of air cylinders to position on a steel grillage with alinement beams laid in a dredged trench with a maximum bottom width of 48 ft. and a depth of 32 ft., one such grillage coming at each joint. The arrangement of the completed tube and the steel frame is shown in Fig. 10. The steel tubes were made of ⅜-in. plates with caulked lapped joints having double rows of ¾-in. rivets. The exterior of each tube was reinforced with transverse vertical diaphragms 12 ft. apart, made with ⅜-in. plates reinforced by pairs of 3½-in. x 3½-in. angles on the outer edges. The shape of the plate conformed to the cross-section of the concrete jacket, the lower edge being horizontal to serve as a cradle supporting the tubes on the steel grillage in the trench. Intermediate between the diaphragms were inside 3-in. x 3-in. flange angles with connections for twelve 1-in. adjustable radial rods connected to a center ring to provide interior bracing and to prevent deformation in handling. Before launching each end of each tube was temporarily closed with a timber bulkhead taking bearing against 3½-in. x 3½-in. inner flange angles of the tube. A pair of tubes 262½ ft. long altogether, weighing about 550 tons, were launched transversely and floated into position between rows of guide piles about 30 ft. each side of the center line of the tunnel. Each tube was equipped with two horizontal steel air cylinders about 10 ft. in diameter and 60 ft. long temporarily secured with adjustable chains to cradles in the diaphragms, as indicated in the general elevation.

The upper end of the trench in which the steel tubes lie was excavated by a dipper dredge and the lower part by a clam shell dredge provided with a specially designed clam shell bucket. The bottom was approximately leveled and the steel grillages sunk into approximately accurate position to receive the steel tubes. After the tubes had been centered over the grillages they were sunk into position by opening inlet valves in the lower part of the bulkheads and outlet valves in the upper part; water enters through the former causing the tubes to sink slowly. Enough water was admitted to sink the tubes below the surface until the air cylinders on top commenced to be submerged, maintaining the tubes in a horizontal position and preventing them from sinking further until their buoyancy was overcome. They were thus maintained in an even balance and gradually lowered to the bottom under perfect control without danger of severe stresses or distortion. After the sections were sunk and adjusted to exact position concrete was filled beneath and around the tubes, forming a monolith concrete structure in which are two steel-lined tubes 23 ft. 4 in. inside diameter This concrete is deposited under water through steel tremies in an outside form with vertical walls, between which and the sides of the dredged trench the space was backfilled. After

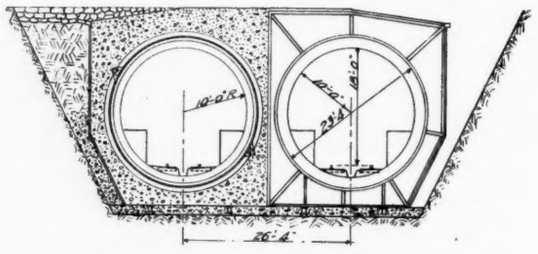


Fig. 10—Detroit River Tunnel.

the outside concreting was in place the tubes were lined with concrete 20 in. in thickness.

The underlying principles of the construction are as follows:

The steel shell serves first as a form for confining the outside concrete deposited through the water and later forms a perfect waterproofing for the completed tunnel. The outside concrete is of sufficient dimensions and strength to resist hydrostatic pressure when the water inside the steel tubes is pumped out in order to enable workmen to go inside and construct the tunnel proper without the employment of compressed air. The outside concrete fills up all depressions and irregularities in the bottom of the tunnel trench and makes, so to speak, its own bed. This will eliminate any tendency to settlement after the tunnel is completed and in use, and if the bottom has a tendency to yield or settle, it will do so while the outer concrete is being deposited rather than after the tunnel is completed. The tunnel proper, which is built inside of the steel shell and the outer concrete casing, is of

sufficient strength to resist all loads, whether hydrostatic, static or live, which may come upon it. It can be built in long sections at a time and under a strict and reliable system of inspection.

(To be continued.)

VALUE OF CARE IN FREIGHT YARD WORK.*

The preventional rules tending toward the minimization of railway terminal yard accidents and damages are many. The remedies I suggest have been tried and found fruitful of good results.

The personnel of the organization is of the foremost importance. It is the kind of men you have and the way they do the business that counts. Find out the class of men in the service and rid the ranks of objectionables—those continually laying themselves liable to dismissal. After closing the back door, as it were, then stand vigilantly at the front in this matter and know the class entering the ranks. Call applicants in and talk with them if a doubt exists as to the action to be taken. This plan often confirms an opinion after an examination of an application and the references therein. Use the veto power without hesitation if you would raise the standard of your organization. The best can be had by close discrimination. He who hunts flowers finds flowers; he who expects weeds gets weeds. Men with others depending upon them as a general rule are the cleanest, soberest and most reliable. The young chap with too much money often injures himself and the service by his conduct while off duty. Men careful about their personal appearance are careful with railway property, simply through the habit of carefulness. While being careful about the employment of men, be still more so about discharging one, especially a man that you have educated to your work. It is unquestionably true that most of the bad accidents in a yard are caused by new men—men who make serious mistakes before they get acquainted with the yard and your methods of doing the work.

By discharging a man with a previous good record for the sake of discipline (an uncertain quantity so many times) you may be hurting the service of your road, for the untried fellow you get in his place oftentimes costs dearly. You can afford to overlook a good deal with a man having a record above the average, rather than take chances with a new man inexperienced in your yard. With an intelligent man a good straight talk has the same effect as it would have with you if you were in his place and the offending one. Have your men realize that so long as they attend to business and do good work, you are "strong" for them, and that their positions are secure. The right kind of an employee likes to feel the security of his position. Have respect for his position as you would have respect for his character. Exercise your power for good by giving all of the men under you a square deal. Do not insult the intelligence of employees by ill-timed or excessive discipline. Where there are wholesale discharges the discipline is not as good as where the discharges are few, and it follows that the damages are largest where the discharges are largest.

A drinking man in a railway yard is a dangerous and an expensive individual. A man who gets to drinking on duty will cause more damage every day or night that he works, even though he only keeps his blood partially fired up, than his wages amount to. An employee found with intoxicating liquor of any kind in his locker, on his person, drinking it with his lunch or drinking it at any other time while he is on duty should be dismissed from the service.

Work grows interesting to that man doing his best to make it better. Seek and hold the conscientious workman in your yard (there are lots of them); encourage him all you can. He takes pride in his work. His conscience will not let him do poor work. He is a happy man, a money-maker for the company and a saver in many ways of the company's good money. No man overburdened with debt, who keeps saturated with liquor or who is deceiving those who trust him can do good work or be really happy. The employee in the yard who plays the game fairly leads a useful life. The thoughtless, careless and incompetent should be sidetracked as soon as possible.

Check closely the reports of accidents and damages. Some men would about as soon be suspended as to have to sit down and write out a report. Since the making out of reports is therefore so important a matter, it behooves superintendents, especially superintendents of terminals where large numbers of cars are handled, to provide the best possible check to insure the getting in of reports after damages occur. A report should be made out on regular form of all accidents or damages and left by the foreman of the crew in the general yardmaster's office, and by engineers in general foreman's or road foreman's office, before leaving duty the day of the occurrence. A serious accident should be immediately telephoned to the superintendent's office. A memorandum should be made of telephone reports, even those where the superintendent is not required to notify higher authorities, and held in the suspense file for a full report. It is not practicable to handle every accident by telephone, but a check can be had on the smaller accidents by getting a daily report from the foreman of the repair track of cars showing up with evidence of rough handling. When a bad order car is found in a yard which has come from some other yard the yardmaster should immediately telephone the particulars to the general yardmaster's office and also to the assistant yardmaster in charge of the yard from whence the car came, that an investigation may be started to ascertain how the damage was done and what crew caused the damage. Yard crews in some places even go so far as to break cars in two and make out no reports. This lowers the bars and opens the way for rough handling evils. Interest begets interest. If officials interest themselves in all cases of rough handling and car damage, if they get every possible check on reports covering the small as well as the large accidents, this solicitous concern is reflected by the concern of the men. It does not require a very close observer to see the effect. There will be one-half again more damage in the yard where there is no system. If a superintendent or a general yardmaster will get and keep a line on all damages, if he will insist on reports being made out by all concerned covering the damages, he can save the amount of his salary many times over every month by this one supervisory plan.

Engineers should stop and start trains skilfully. When trains are being shoved the men should not give violent stop signals except in emergency. Engineers stop according to signals given them. Extreme signals by yardmen to engineers are the cause of a great deal of damage. Here is where the importance of a foreman comes in. If he is careful about his signals and insists upon his men being the same way the engineer knows what to depend upon and how to handle engine. It is important for general yardmasters and assistants to see that each engine crew, and yard crew with the engine, cooperate to the fullest extent in the way of giving and taking signals. Not every switchman will make a foreman. Carefully look over the available men in making promotions. The good foreman considers the temperature and the weather; considers whether a car is loaded or empty; considers the direction and velocity of the wind; remembers what he has sent in on a track so as to make subsequent cuts into the track; boosts cars just far enough to couple on to stationary cars in on the track without causing damage; wastes no time shoving tracks at frequent intervals to close up gaps he has left by poor figuring; uses his head more and his feet less, and makes no false moves on the yard checkerboard.

In many yards where derailment occurs, the car gotten off track is put back on and started along, only to be derailed

*Extracts from a paper read before the St. Louis Railway Club by Charles Burlingame, Superintendent of the Wiggins Ferry Company. This company operates 13 miles of railway.

again. This can be avoided, if, when a car is first derailed, the yardmaster calls an inspector to inspect it. The first available inspector should be required to look over the car. It should not be moved out of the district where the derailment occurred until inspection is made. In case a foreign line crew has a car off the track, arrangements should be mode by assistant yardmaster, through the office of the general yardmaster or the superintendent, for a joint inspection of the car by the foreign line and home line inspectors, while the case is fresh, to determine responsibility, thereby saving an endless amount of correspondence in trying to get at the responsibility after the facts get cold.

A common cause of damage is the cornering of cars by shoving through a track where a car on a converging track does not clear. Some foremen have a habit of shoving cars into such tracks blindly and pushing them down without regard to what the conditions may be at the far end. This dangerous procedure is the cause, I might say, of the most serious mishaps in railway yards. Always send a man ahead. Another inexcusable carelessness in railway yards is the coupling of a car with the load protruding over the end in to a box car, instead of cutting in a trailer. Cars in a weakened condition or slightly damaged we placard with a special card; also require car inspectors, when they find it necessary to card a car on connection track, to make a notation on a blank card showing car number, initial and location in the track and tack this card on head car on connection track to notify foreman of switching crew that there is a special bad order in on the track. Yardmen know that a car with this card tacked on it requires special handling. A general order has been issued on the subject to yardmen that they handle such cars separately and alone. Before these instructions were issued cars slightly damaged were often put in heavy trains and the damage very much augmented before they reached the repair track or unloading point. Where coupler attachments or other parts of a car are weakened sufficient to justify their being sent to the repair track, much money will be saved by giving such cars special attention. Weakened cars will run hundreds of miles in a road haul without giving trouble, and only give way when put to the heavy strain of switching in terminals.

A new air hose and a large wrench should be provided on each yard engine, the wrench for removing and applying air hose. When a hose is used, take care to charge it to the right car. Cars loaded with bulk bottles or other easily breakable material, either loading or unloading on a track where the work will not be finished before the track is to be switched, should be put at the farthest end of the track, and the foreman switching in on that track should see that his cars are left a sufficient distance away. These cars should be loaded and unloaded in some out-of-the-way place and not be disturbed by switching. Large claims are being paid by railways right along because such cars are disturbed while loading or unloading. The car does not necessarily have to be roughly handled to cause damage. Ordinary handling will cause it.

In all terminals there are here and there bridges, buildings, platforms, switch stands, signal stands and other obstructions which do not clear extra large, extra long or leaning cars. Issue a general notice calling attention of yardmen to the kind of cars that will not clear. This emphasizes the importance of keeping regular men in the service, foremen who are acquainted with the physical conditions, since in these modern days cars are being built larger and larger. Most damages happen where a new foreman is in charge of a crew. These are very aggravating accidents to proprietors of industries on your rails. The remedy is proper notice to employees, watchfulness to see that the notices are complied with and steady working foremen in that part of the yard territory.

There are also places which do not clear a man standing on top of a covered car, or hanging on the side of any kind of a car. We all realize how dangerous they are to life and limb. These should be clearly designated on the back of your application blank, and new places that spring up from time to time covered by general notices until new supply of the application blank is printed. Yardmen must be kept acquainted with these points; they must be cautioned to be very watchful while working about them and not take any chances on getting injured.

In some cases yardmasters expect too much work out of an engine. One day of worry is more wearing on a man than ten days of sweet-tempered work. * * * Let me think aloud about the matter of kicking cars too hard in switching. It is a business that is entirely in the hands of yardmen. Yardmen should give stop signals before the cars attain too much momentum, remembering that if they do not run in to clear it is cheaper to go down and shove them in.

Did you know that where a car loaded with grain is damaged and some of the grain leaks out that often the spilt grain will be shoveled back into the same car? We take the grain and use it for our company teams or sack and sell it. When it is shoveled up and thrown into the original load it invariably results in refusal of car by consignee, whether any dirt gets in with the grain or not.

Probably the most prevalent accidents in a yard are those where couplers and draft timbers are pulled out. The draft rigging seems to be the weakest point in car construction; therefore, when a car has one sleeve bolt broken or gone, two draft bolts broken or gone from one timber, or two or more lug bolts gone from one lug, I say the car should be riptracked. Where this is done the pulling out of couplers and draft timbers will be reduced to a minimum and growth of damage avoided, which spells money saved through timely attention. * * * Car doors which fall off should be loaded into the car they belong to, if possible; if not, place the door clear of rails and give the general yardmaster or foreman of repair track a memorandum. In this way special attention can be given to the matter of picking it up, whereas if no attention is given to it the door will be stolen for shanty or fence construction, or will be run over and destroyed. Do not allow doors to be thrown indiscriminately into empty cars to clear the yards. Load them either into car bearing same number and initial as the door, or into a foreign empty after it is carded to the repair track, to deliver the door there; on the prineiple that it is cheaper to pay 25 cents per diem on the foreign car and do the switching rather than allow a $5 door to go astray. A car door in medium good condition is worth about $5.

If properly instructed, careful switch foremen in charge of trains, those handling transfer trains in either direction between different zones in a chain of yards, or handling deliveries to another road for a considerable distance, will look them over, or have a responsible helper do so, to see that all hand brakes are released, air-brake retaining valves properly adjusted and car doors fastened, in this way preventing the sliding and flattening of wheels, tearing off of car doors, battering of switch lamps or signal posts, saving much by their carefulness. At some places inspectors do not look over trains before they are started out; here is where it devolves upon the foremen to look them over. A car with brake set does not have to be hauled far to slide the wheels. If they are flattened it costs about $10 a pair. Little precautions can save the railway company many dollars. Where a freight train or a switch cut has to take run for a hill in terminals, the conductor or foreman should, in all cases, before attempting to make the run, send one of his men to the top of the hill to see that all intervening switches are properly set; that wagons on intersecting or paralleling streets are out of the way, and cars on side tracks are in to clear.

Yardmen should not attempt to use a new track anywhere until it has been regularly turned over to the transportation department by the maintenance-of-way department.

A frequent cause of damage is the shifting of dressed lumber. If a car is struck hard, lumber starts sliding and the

end of the car is broken out. I have thought it might be worth while, particularly on roads that handle a great deal of this material, to get specially built cars, having the ends reinforced with steel plates anchored into steel sills.

Refrigerators having side doors that swing out, when carded empty, should have doors securely latched by yard clerk doing the carding; and car inspectors should give such cars special attention on receipt from connections to see that the doors are securely latched.

When push poles, chains or rerailing frogs are broken the pieces should be placed on engine and report sent to general yardmaster by foreman of crew on proper form explaining the accident, and the engineer on the engine should, after turning in, morning, noon or night, be sure to get new ones before leaving engine house. The lack of these instruments where they ought to be, on the engine, convenient, when they are needed and are not there, costs railways astonishingly. It is false economy for locomotives to be without push poles, chains and rerailing frogs.

Many dangers occur in stopping trains on curves, thereby causing couplers to pass each other and break guard arms off. Engineers can save this damage by taking slack properly and applying brakes scientifically. An engineer who does not take slack properly or who uses poor judgment in applying brakes will cause hundreds of dollars of damage that a more careful man on engine will avoid.

Switch lights should be on all main line yard tracks and on main lead tracks. Switch lights enable men to do more work and avoid many accidents. Men cannot work quickly nor safely where they have to grope around the yards in the dark without any markers to indicate how switches are set.

There should be a general order and general notice board in each cabin or office frequented by assistant yardmasters, engineers, firemen, hostlers, trainmen and yardmen. These boards should be incased in a box with a glass front to protect the sheets from the dirt and keep them from being torn or destroyed. Men can read them through the glass front, and they are much better preserved than if hung out in the open. General notices play an important part in the avoidance of damages. The files should not be encumbered with dead timber to the confusion of those reading, particularly new men.

Yard enginemen, foremen and switchmen should not be worked any part of the noon or midnight meal hour, nor should they be worked overtime, except in the most extreme emergency cases. They need a full hour in which to partake of lunch at noon and midnight and need, to give good service after lunching, a suitable switch house, where they can be comfortable while the important part of digestion is taking place. An ill-digested meal or working over a reasonable number of hours causes a man to become sulky and makes him reckless. If this meal does not settle well or a man has worked too long hours it shows both in his physical and mental work. Any man when ill-tempered is more likely to be reckless. The starting time of crews can be graduated and the spacing of crews around noon and midnight can be regulated by some figuring, so that the forces can be given an hour in which to eat and not work more than ten hours continuously. When this is done the men will grow to like the conditions better. Where overtime is tolerated there is a continual temptation on the part of most men to overdo. They lose sight of their physical selves. Some drag out their work to get in overtime in their anxiety for the money they make working it. This is a matter which can be looked after by superintendents to the everlasting profit of the railways. Let the superintendent view the physical aspect of the matter, not only for the good of the men, but in the interest of the service. He can do it to the physical good of the men and to the financial benefit of the company. Men need rest and recuperation, and show the result of it in their work after dinner or after midnight lunch hour. If they enjoy their hour, which they will under right conditions, they come out eager to drive their work before them. The condition of the minds of men has a great deal to do with the proposition. The general yardmaster and his assistants should strive diplomatically to keep foremen and engineers in the proper frame of mind while they are on duty, and the foremen and engineers in turn use the same influence on those under them. It helps so much to get along pleasantly and harmoniously. When a crew does get along pleasantly the men are anxious to come out to work and to prosecute it vigorously. Where men get at loggerheads with each other they have been known to give violent signals and otherwise "try" themselves, thinking they are taking their spite out on the object of their hatred; but they are only tearing company property to pieces. When they come to make their explanation tempers have subsided and a frame-up of reports relative to the damage may occur if the yardmaster gets on to the case and they actually have to make out reports at all. * * * Do not force men to work together where you know an antagonism has grown up, if by changing around it can be avoided. The feeling is liable to grow worse. It can easily be cured if the men are half sensible. I have seen cases where a man changed off in this manner would do the best kind of work.

Replying to a question Mr. Burlingame said: In regard to following men off duty as to drinking. We do not do this unless the man's appearance while at work indicates that he is drinking heavily. If I know him to be a drinking fellow that stays up half the night in and around saloons, drinking and influencing other men to drink with him, I have followed them up. I have called men into the office and proved to them just how much they took in each saloon, who they drank with, and have warned them if they did not stop it they would be dismissed. If a man drinks immoderately off duty it is our business. What he does off duty, if he takes care of himself, is not especially our business. I have found that when we tell these men where they drank and what they drank, they know that we have such good tab on them that they stop it. I have not had any trouble. If a man is dismissed for drinking, or any other charge where liquor is concerned, I simply give them a certificate discharging them "for violation of rules," or simply say "dismissed," without giving a cause at all.

ELECTRIC TRACTION.*

BY GEORGE GIBBS,
Chief Engineer of Electric Traction, Long Island Railroad; Chief Engineer of Electric Traction, Pennsylvania Tunnel and Terminal R.R.

ELECTRIC LOCOMOTIVES.

Electric locomotives for heavy service are still in the development stage; much has been done towards perfecting their design, but much remains to be done before the questions of their design and practical performance reach the stage of accumulated knowledge which we possess of these elements in steam locomotives. In the earlier stages of the art, attention was mostly directed to the perfection of electric apparatus; the importance of the mechanical features of the machine in its adaptation to track conditions, were not fully appreciated. In fact, it was assumed that the characteristics of rotary motion and uniform torque, possessed by an electric motor, made its application to a locomotive a simple matter, and removed one of the chief defects of a steam locomotive, the unbalanced reciprocating weights and unsymmetrical turning effort, which were held to be destructive to track. Experience has taught, however, that there are other elements in a locomotive which may be even more destructive; namely, unduly low center of gravity and improper weight and wheel base distribution. Defective design in these respects becomes especially noticeable in a machine where power is applied with extraordinary compactness, and where the machinery for its development is naturally centered around the driving axles, and

*From a report to be presented before the International Railway Congress.

the weight concentrated below the wheel tops. It appears to be a fact that in present designs of electric locomotives, a given total weight and individual wheel weight is more destructive to track than the same weight distributed as in steam locomotives. It is noticeable in motor cars even, that the quite moderate axle weights of a motor truck have an unfavorable effect upon economy in track maintenance.

Th importance, therefore, of a study of the electric locomotive problem from standpoints other than that of power development, is being recognized and the co-operation of practical railway men in the design is being sought.

The first electric locomotives were practically powerful motor cars; that is, single-reduction motors were mounted on bogie trucks and carried a body and cab for housing the control apparatus. Then steam locomotive design began to be copied in the use of rigid frames carrying at times four axles and motors, and gearless motors of large capacity and great weight were employed. In the greater number of the earlier designs all weight was adhesive for driving—a feature which was supposed to constitute one great advantage of an electric over a steam locomotive.

These heavy and powerful locomotives at high speed began to manifest their bad riding qualities, and they were suspected of being "hard on track." In order to bring out the facts experimentally, the Pennsylvania Railroad Company, who were about to design locomotives for their tunnel entrance into New York City, constructed a special test track with apparatus for measuring side pressures upon the rail; they built sample locomotives of different designs and instituted a series of tests of electric and steam locomotives to determine their relative riding qualities at speed. It is not the purpose of this report to go into the results of these tests in detail, but some of the more important conclusions may be stated in general as having a bearing upon the radical departure determined upon in design of their high speed electric locomotives.

It was found that all types of locomotives were practically steady at speeds under 40 miles per hour, but that above this speed marked differences appeared; that the steadiest riding machines were those with high center of gravity and with long and unsymmetrical wheel base. In other words, that the nearer steam locomotive design is approached in wheel arrangement, distribution of weight, height of center of gravity and ratio of spring-borne to under-spring weight, the less the side pressures registered on the rail head.

In addition to the excessive side pressures on the rail head, due to the oscillation and "nosing" of a low center of gravity machine, abnormal track effects may be caused by the vertical pounding due to a large non-spring-borne motor weight, or to weights with imperfect spring cushion. A remedy for all of these defects appears to mean a radical departure in the design of a high speed locomotive, both as to its running gear and as to the form of motor drive. It means a combination of driving and carrying wheels, an unsymmetrically disposed wheel base and the setting of the motors on the main frames above the axles. The extent of the departures in practice thought desirable for heavy high speed locomotives is shown in the diagrams and photographs of the Pennsylvania locomotive. It will be noted that it is a "double locomotive," the halves being permanently connected, with the wheel arrangement of two "American" type steam locomotives (4-4-0) set back to back. Each half locomotive has a single very large gearless motor, set on top of the frames and driving through connecting rods to a jack shaft and thence by main and parallel rods to the wheels. The main features of this design may also be worked out by combining motor gearing with rods and with economy in motor cost on a slow-speed locomotive, but it was thought that the purely rod-drive was more suitable for high speed service. It will be interesting to observe from the diagram its similarity to a steam locomotive in the height of center of gravity and the ratio of spring-borne to non-spring-borne weight.

FIRST COST.

It is difficult, in fact, practically impossible to give any general statement of the first cost of electrification which can be safely applied to individual cases. In the case of an entirely new line, built for traction by electricity, unit costs may be made to apply, but in the case of conversion of an existing steam line there are many callateral costs to be considered aside from those of electric equipment. In few cases will an electrified steam railway be conducted precisely in the same manner as that previously done by steam; that is to say, multiple unit train service at frequent intervals will displace part or all of the infrequent locomotive train service; existing tracks, yards and terminals, stations, signaling and telegraph lines must be changed to a greater or less extent to adapt the road to the new class of service; special rolling stock must in part be purchased and in places new real estate acquired.

It therefore results that each electrification must be dealt with as a separate and individual problem and cost figures for one situation will generally not apply to another, even if the other road is of similar character. Generally speaking, the cost of converting a steam railway is very high under American conditions, taking into account the changes in the physical property and equipment it will at times mean a doubling of the existing capitalization.

The high cost of conversion will act as a deterring factor upon additional electric construction until a sufficient number of installations are made to furnish evidence of the advantages and economy of electric traction; in fact, railway managers although watching closely, and with interest, the pioneer installations of electric operation on steam roads have not been anxious to duplicate experiments in advance of a demonstration of the results, and are awaiting this demonstration.

As elsewhere stated, the systems available for heavy traction are the A. C.-D. C. and the straight A. C., either single phase of polyphase. Comparative first cost figures for these two systems would be interesting, but are available only from estimates for the reasons before given and because of the fact that the systems are not in the same stage of development; thus, figures of cost for A. C.-D. C. would be more exact than in the case of the single phase because figures for the latter system must be made on assumptions of present methods of application, and these methods are, it is thought, susceptible to important modifications.

Considering the electrical items of installation, the chief elements of cost may be grouped under three headings; the power house, the transmission system from power house to the cars, and the train equipment.

Of these three divisions, in general the power house is the least expensive and the train equipment the most. For illustration, and comparing figures for the two systems, an estimate may be given of the case of a trunk line road with dense suburban traffic conducted by multiple unit trains and with an important through business conducted by electric locomotives. The percentage of the total electrical cost carried by the three equipment divisions were as follows:

	System—	
	A. C.-D. C.	A. C. (single phase).
Power house	23 per cent.	25 per cent.
Transmission, power house to cars	35 "	22 "
Train equipments	42 "	53 "
Total	100 per cent.	100 per cent.

These percentage figures are given to show the relative importance, as regards cost, of the three divisions for the two systems, and shows the larger proportion carried by the train equipments of the single phase system.

The actual money value of the various costs would not be useful without a detailed presentation of the case, but the important fact developed was that there was little difference figured for the total first cost of either system. In other words, as at present developed, it appears that for a dense suburban

service conducted by multiple unit trains, or, in the case of locomotive haulage in terminals or over short lengths of a main line, there would be little difference in first cost between third rail A. C.-D. C. system and the single phase alternating current system; in fact, the figured differences are so small as to be within the limits of error in calculation. As, however, the length of line increases and as the frequency of trains becomes less and the weight of the trains increases, the single phase system becomes cheaper in comparison with the A. C.-D. C. and a substantial saving in first cost can be effected by the use of single phase on such lines. In fact, for long trunk line work and with the average density of traffic found on American railways, the first cost of the A. C.-D. C. system would certainly be prohibitive, whereas there will be found instances where this will not be the case with the alternating current system. It is, of course, a matter of importance to determine the prospect of reducing first cost. This might be accomplished by lowering in price of apparatus, or by a radical change in system, or by both. There appears to be a reasonable prospect of some substantial reduction in the first cost of electric apparatus, as the market for same broadens, but the manufacturers do not promise very radical reductions. As to the prospect of a change to a system inherently simpler and cheaper than existing ones, it would be unprofitable to predict what the future may bring forth; a system which would eliminate the element of transmission, power house to cars, would seem to open up a prospect of important simplification and cheapening, but such a system does not appear to be in process of development.

COST OF OPERATION.

This is a matter of the highest importance to railway officials, since the question of net yield is the foundation for an investment. High first cost may act as a deterrent in the rapid introduction of an improvement, but in the end a new system will prevail if the operating results, as measured by the net earnings, show a betterment. Under another heading will be given a summation of the advantages of electric traction and a statement of its probable field, but it is here proposed to give such concrete examples of operating costs as are available to the writer. It is to be regretted that the list it not longer, but it includes, perhaps, the only cases in which important installations have been in complete operation for a long enough period to furnish comprehensive figures.

The installations referred to are those on the Long Island Railroad and the West Jersey & Seashore Railroad, and figures are presented for two complete years, operation in each case.

Below are condensed tabular statements, taken from the complete monthly and yearly tables, of the figures which can be usefully given without lengthy explanation. They may be referred to as follows:

Table 1 gives a concise statement of the camparative physical characteristics of the electric installations on the two roads, from which a general idea of the magnitude of the operation may be gathered.

Table 2 gives average number of cars in trains and the average weight per car. It will be noted that the average weight per car changes slightly in the two years, due to a change in the ratio of the motor to trailer cars.

Table 3 gives comparative figures for electrical quantities and efficiencies and is of interest in showing the distribution of the various losses in electrical energy from the power house to the cars. The figures for power consumption per ton-mile and per car-mile represent fair averages for electric installations of the character in question and in a climate which requires a considerable consumption of energy in winter for heating the cars. Electric heating adds very largely to power consumption, as will be illustrated when it is stated that, in summer months, the watt-hours per ton-mile at substations on the West Jersey & Seashore Railroad were about 63, while in mid-winter months this figure rose to 100; the larger part of this difference is due to the additional energy required to light and heat the cars in winter. It is interesting to note also that the efficiency of the electric system from the power station to the point where the current leaves the substation for feeding into the third rail is from 70 to 80 per cent., depending upon the loading during the various months; in the busy months, the efficiency will at times run as high as 85 per cent. The losses from the substation to the cars in the direct current feeder system cannot be accurately measured, but in the cases cited it is estimated to be between 5 and 10 per cent. The figures given for "current used for other purposes" illustrate the considerable and useful consumption of power for running shop motors, lighting stations and operating the signal system.

Table 4 gives the cost of generating current at the power house and cost of the current when delivered at the cars. The former figures include all power house operating and maintenance expenses, but no fixed charges, taxes or depreciation charges. The "delivered cost" includes the operating and maintenance cost for transmission lines, third rail, track bonding and substations and allowances for losses in transmission of the current and its conversion to direct current delivered at the car contact shoes. It should be noted, however, that the above figures do not include any maintenance expenses other than for electrical apparatus, and no portion of the general expenses of the railway.

Table 5 gives the monthly car mileage and cost per car-mile; the total yearly mileage and the average car-mile cost; and average yearly cost per 1,000 ton-miles moved. The cost per car-mile includes the following: The cost of power, maintenance of third rail and track bonding, maintenance of car bodies and trucks, maintenance of way and equipment expenses, conducting transportation and traffic expenses, general expenses, wages of motormen and train crews; in fact, all operating expenses of the railway. In comparing the costs per car-mile, the difference in weight of cars, given in table 2, should be noted; it should furthermore be explained that in the case of the Long Island Railroad, all trains may be termed "local" as the average length of the run on the so-called express service is only about 2½ miles, whereas on the West Jersey & Seashore Railroad about one-third of the total train-miles are made in cross-country express service with an average length of run of about 25 miles between stops, and the remaining service termed "local" averages 2½ miles between stops, or about the same as express service on the Long Island Railroad. In other words, the Long Island installation may be considered purely local service in a densely populated district, whereas the West Jersey service approximates main line railway conditions with long runs.

GENERAL REMARKS UPON TABLES.

As before stated, the two roads have been in operation for a sufficiently long time to rather definitely establish the behavior of all apparatus in practical service; there is no indication that in subsequent years of operation there will develop cause for extraordinary maintenance in any particular items due to the accumulative effect of service. It should be noted, however, that no account is taken of possible advances in the electric art, which might make the equipment obsolete; in other words, no "depreciation" account has been kept. In a rapidly advancing art, replacements on account of "change of type" are quite possible contingencies, but much difference of opinion exists upon this whole subject in America and its pros and cons cannot be entered into in this general report.

Of the total cost per car-mile, one-third is due to cost of supplying power to the car, including maintenance of all parts of the electric system on the car, and of this figure about one-half is the cost of the power alone. In both roads the load conditions at the power houses are not ravorable, nor is the quantity of power turned out as large as it is expected to be in the near future, so that the item for cost of power at the car should come down considerably as the magnitude of the operation increases. Other items also in the total cost per

car-mile, namely, general expenses of various kinds and wages of motormen and train crews, are largely affected by density of traffic and have a downward tendency.

The list of detentions looks quite formidable, but when analyzed the general result is found to be good. Motors, as before stated, have been brought to a high state of perfection and detentions caused by their failure on the road are rare and largely due to overloading. The temptation in electric service is constantly to overload, either quickening the schedule, increasing the number of stops or adding trailer cars; this is due to the fact that the apparent limit of capacity of railway motors is their ability to make schedule and it is often not remembered by the railway superintendent that this is far beyond the heating capacity of the motors.

Where all cars in a train are motor cars, overloading cannot be as readily accomplished as where trailers are hauled, especially if the motors have been designed to take care of a continuous running condition with the minimum number of stops, as is generally the case.

The multiple unit control system is a very complicated assemblage of delicate apparatus, but works surprisingly well and when properly maintained it will be noted gives very little trouble.

COST COMPARED WITH STEAM.

Considering the figures for the year 1908 it is seen that the Long Island road operated their electric mileage at a cost of 17.80 cents per car-mile; the steam train mileage cost 27.95 cents, a difference in favor of electric traction of 10.15 cents per car-mile. On the West Jersey & Seashore Railroad the electric mileage cost 20.46 cents per car-mile as against 22.30 cents for the steam mileage, or a saving for the electric service of 1.94 cents per car-mile.

The relatively unfavorable showing on the West Jersey for electric saving is in part accounted for by the difference in character of the service on the two roads, as before explained, and by the fact on the Long Island road the average length of train in steam service was about the same as in the electric and the stops frequent; it was, therefore, costly service. On the West Jersey the average cars per steam train was twice that of the electric and much of the service was long distance express with few stops and of an exceptionally economical character.

OPERATING COSTS OF A. C.-D. C. VS. A. C.

A comparison of this kind must, at present writing, be based on estimates and opinion, as no operating figures for the A. C. systems are obtainable. It is the opinion of the writer that the maintenance costs of the single phase system, as at present developed, will be somewhat higher than for the A.C.-D.C., but not by an important amount; eventually the maintenance costs should be about the same for either system. The total operating cost figure, however, will probably be in favor of the single phase system, because of the higher average efficiency of this system and the lower operating cost of substations. The importance of the savings possible for the single phase will depend upon the character and extent of the traction scheme, becoming greater as the length of line increases and the density of traffic decreases. It is impossible, however, to generalize safely and each case should be considered upon its own merits.

An estimate may be given for the particular case referred to under the "first cost" heading, in which it was figured that about 13 per cent. less energy at the power house would be required for the single phase than for the A.C.-D.C. system. This, together with the saving in substation operation, would

Table 1.

	Long Island Railroad. 1907.	Long Island Railroad. 1908.	West Jersey & Seashore R.R. 1907-1908
Route miles of track	37.6	43.9	74.6
Miles of single track	90.0	98.69	152.5
" " high-tension pole line	41.0	42.0	69.59
" " " circuit (3-phase)	70.24	80.03	417.54
" " " circuit (1-phase)	14.1	9.7	None.
" " conduit	9.09	9.09	None.
High-tension transmission voltage	11,000	11,000	33,000
Number of substations	6	6	8
Number of portable substations	2	2	None.
Capacity of substations	19,500	19,500	17,000
" portable substations	2,000	2,000	None.
" of power house	16,500	16,500	8,000
Number of motor cars	130	132	80
" " trailer cars	84	82	None.
" " baggage and mail cars	5	5	8

Table 2.—*Weight of Cars and Make-up of Trains.*

	Long Island Railroad. 1907.	Long Island Railroad. 1908.	West Jersey & Seashore R.R. 1907.	West Jersey & Seashore R.R. 1908.
Average car per train	3.70	3.94	2.95	3.45
Av. tons per car (ton of 2,000 lbs)	37.8	36.5	47.9	47.4

Table 5.—*Car-mile Costs.*

Month.	Car-miles. West Jersey & Seashore R.R. 1907.	Car-miles. West Jersey & Seashore R.R. 1908.	Car-miles. Long Island Railroad 1907.	Car-miles. Long Island Railroad 1908.	Cost per car-mile. West Jersey & Seashore R.R. 1907. cts.	Cost per car-mile. West Jersey & Seashore R.R. 1908. cts.	Cost per car-mile. Long Isl'd R.R. 1907. cts.	Cost per car-mile. Long Isl'd R.R. 1908. cts.
Jan.	294,672	281,723	235,828	201,128	27.50	29.29	28.16	26.97
Feb.	255,344	271,542	214,242	186,256	30,90	28.53	30.04	27.87
Mar.	270,286	291,959	241,024	224,919	23.90	26.57	28.05	24.77
Apr.	244,431	331,224	281,509	271,224	24.30	21.34	24.05	23.94
May	267,317	323,584	347,211	382,195	21.50	19.97	21.39	20.90
June	292,767	344,523	349,133	478,793	22.50	18.92	22.32	18.00
July	435,860	451,149	392,514	628,511	15.30	16.17	15.73	13.53
Aug.	478,041	485,565	400,880	632,388	14.90	13.71	15.59	13.26
Sept.	411,359	369,204	299,798	509,213	15.85	17.17	19.87	14.79
Oct.	317,141	312,833	306,138	441,638	23.50	19.55	22.37	17.21
Nov.	292,349	282,322	245,748	345,640	21.40	20.42	25.93	22.29
Dec.	295,097	292,397	212,144	360,325	22.60	22.68	27.48	22.45
Total	3,854,664	4,044,025	3,526,227	4,662,230	21.30	20.46	22.45	17.80
Cost*	.....	.....	.....	.....	$4.406	$4.307	$5.94	$4.86

*Per 1000 ton-miles.

Table 3.—*Energy Consumption.*

	1907. Long Island Railroad.	1907. West Jersey & Seashore R.R.	1908. Long Island Railroad	1908. West Jersey & Seashore R.R.
1. A. C. kilowatt-hours received at substations	20,341,826	.....	21,899,739	.....
2. Efficiency of H. T. transmission	96.2	.....	97.7	.....
3. D. C. kilowatt-hours delivered from substations	16,138,965	14,585,900	18,138,515	16,088,300
4. D. C. kilowatt-hours used for electric traction	13,466,995	13,530,659	16,201,962	14,780,145
5. D. C. kilowatt-hours used for other purposes	896,075	389,672	901,934	731,771
6. Kilowatt-hours lost in conversion from A. C. to D. C.	4,202,861	5,882,510	3,761,224	5,997,020
7. Efficiency from power house to substation bus-bars	78.52 per ct.	72.15 per ct.	81.3 per ct.	73.8 per ct.
8. Total ton-miles-passenger	141,541,106	184,615,535	180,129,860	192,472,541
9. Car-miles-passenger	3,808,479	3,855,580	4,945,719	4,044,025
10. Train-miles-passenger	1,021,102	1,305,663	1,251,877	1,172,894
11. Watt-hours per ton-mile at substations	95.2	73.29	90.0	76.8
12. Watt-hours per ton-mile at power house	121.2	101.58	110.6	104.0
13. Kilowatt-hours per car-mile at power house	4.51	4.86	4.028	4.95
14. Kilowatt-hours per car-mile at substation	3.54	3.51	3.276	3.66

Table 4.—*Current and Maintenance Costs.*

	Long Island Railroad. 1907.	Long Island Railroad. 1908.	West Jersey & Seashore R.R. 1907.	West Jersey & Seashore R.R. 1908.
Cost per kilowatt-hour at power house	0.804 cents.	0.697 cents.	0.680 cents.	0.592 cents.
Cost per kilowatt-hour at cars	1.705 "	1.461 "	1.302 "	1.151 "
Cost per car-mile for maintenance of electrical equipment on cars	0.71 "	0.76 "	.....	.....
Net output in kilowatt-hours at power house	.....	31,517,200	.....	22,887,800
Pounds of coal per kilowatt-hour	.....	3.29	.....	3.36
Cost of coal per ton (of 2,000 lbs.)	.....	$2.512	.....	$2.1814
Number and capacity of units	.....	Three: 5,500-kw.	.....	Four: 2,000-kw.
Total kilowatts capacity of power house	.....	16,500	.....	8,000

TABLE 10.—GENERAL CHARACTERISTICS OF ELECTRIC LOCOMOTIVES.

	Baltimore & Ohio Railroad		New York Central & Hudson River R. R.		Pennsylvania Railroad			New York, New Haven & Hartford R.R.		Spokane & Inland Railroad.		Gr. Trunk Sarnia Tun'l.	Great Northern Ry.	Mich. Cent. Detroit R. Tunne'.
	Passenger.	Freight.	Original.	Revised.	Experimtl.	Experimtl.	Passenger.	Original.	Revised.	Freight.	Freight.	Pass. & Ft.	Freight.	Freight.
Key No. for reference to diagrams and curves	1	2	3	4	5	6	7	8	9	10	11	12	13	14
General:														
Builder: Mechanical	Am. Locomotive Co.	Am. Locomotive Co.	Am. Locomotive Co.	Am. Locomotive Co.	Pennsylvania R.R.	Baldwin Loco. Wks.	Pennsylvania R.R.	Baldwin Locomotive Wks.	Baldwin Loco. Wks.	Baldwin Loco. Wks.	Baldwin Loco. Wks.	Baldwin Loco. Wks.	American Loco. Co.	American Loco. Co.
Builder: Electrical	Geheral Elec. Co.	General Elec. Co.	General Elec. Co.	General Elec. Co.	Westinghouse Co.	Westinghouse Co.	Westinghouse Co.	Westinghouse Company.	Westinghouse Co.	Westinghouse Co.	Westinghouse Co.	Westinghouse Co.	General Elec. Co.	General Elec. Co.
Date built	1895.	1903.	1906.	1908.	1905.	1907.	1909.	1906.	1908.	1906.	1907.	1907.	1908.	1909
Type	0-4-4-0	0-8-0	2-8-2	4-8-4	0-4-4-0	4-4-4-4	4-4-4-4	0-4-4-0	2-4-4-2	0-4-4-0	0-4-4-0	0-6-0	0-4-4-0	0-4-4-0
Number of driving wheels	8	8	8	8	8	8	8	8	8	8	8	6	8	8
" " truck wheels	.....	.....	4	8	..	8	8	..	4	.....	.....	.....	8	8
" " motors	4-DC.	4-DC.	4-DC.	4-DC.	4-DC.	4-DC. sngle phase.	2-DC.	4-AC. single phase.	4-AC. single phase	4-AC. single phase	4-AC. single phase	3-AC. single. phase	4-AC.3-phse	4-DC.
Dimensions:*														
Length over couplers	35 ft. 0 in.	29 ft. 0 in.	37 ft. 0 in.	43 ft. 0 in.	36 ft. 5 in.	65 ft. 8 in.	64 ft. 11 in.	37 ft. 7 in.	37 ft. 7 in.	32 ft. 1 in.	38 ft. 3 in.	29 ft. 4 in.	44 ft. 2 in.	39 ft. 6 in.
Width of cab	9 " 5 "	9 " 5 "	10 " 0 "	10 " 0 "	10 " 2 "	10 " 0 "	10 " 0 "	9 " 7 "	9 " 7 "	9 " 6 "	9 " 6 "	10 " 2 "	10 " 0 "	10 " 0 "
Height, rail to top of roof	14 " 3 "	13 " 8 "	14 " 4 "	13 " 9 "	13 " 1 "	13 " 1 "	13 " 1 "	12 " 2 "	12 " 2 "	11 " 9 "	12 " 2 "	13 " 0 "	14 " 2 "	12 " 4 "
Driving wheel base	23 " 2 "	14 " 7 "	13 " 0 "	13 " 0 "	26 " 1 "	30 " 0 "	24 " 1 "	22 " 6 "	22 " 6 "	21 " 1 "	24 " 10 "	16 " 0 "	31 " 9 "	27 " 6 "
Truck wheel base	6 " 10 "	.....	.....	6 " 0 "	8 " 6 "	6 " 2 "	6 " 7 "	8 " 0 "	8 " 0 "	7 " 4 "	9 " 6 "	.....	11 " 0 "	9 " 6 "
Rigid wheel base	6 " 10 "	14 ft. 7 in.	13 " 0 "	13 " 0 "	8 " 6 "	7 " 6 "	7 " 2 "	8 " 0 "	8 " 0 "	7 " 4 "	9 " 6 "	16 " 0 "	11 " 0 "	9 " 6 "
Total wheel base	23 " 2 "	14 " 7 "	27 " 0 "	36 " 0 "	26 " 1 "	56 " 2 "	55 " 11 "	22 " 6 "	30 " 10 "	21 " 1 "	24 " 10 "	16 " 0 "	31 " 9 "	27 " 6 "
Diameter of driving wheels	62 in.	42 in.	44 in.	44 in.	56 in.	72 in.	68 in.	62 in.	62 in.	38 in.	50 in.	62 in.	60 in.	48 in.
Diameter of truck wheels	.....	.....	36 in.	36 in.	.....	36 in.	36 in.	.....	33 in.	.....	.....	.....	.....	.....
Weights:														
Per driving axle, in lbs.	48,125	40,000	33,500	35,500	48,785	54,900	55,800	48,000	40,500	25,070	36,250	42,200-47,000	57,500	50,000
Per truck axle, in lbs.	.....	.....	28,000	22,000	.....	21,150	26,400	.....	20,000	.....	.....	.....	.....	.....
Total, in lbs.	192,600	160,000	190,000	230,000	195,140	304,000	328,800	192.000	202,000	100,280	145,000	131,400	230,000	200,000
Per ft. of wheel base, in lbs.	8,340	11,000	7,040	6,400	7,500	5,430	5,870	8,540	6,530	4,750	5,830	8,200	7,220	7,280
Center of gravity of locomotives	43.2 in.	40.5 in.	44.4 in.	40.0 in.	42.5 in.	55.0 in.	63.75 in.	53.0 in.	.....	.....	.....	51 in.	60 in.	42.5 in.
Speed: Approximate with full load on level, miles pr hr.	20	10	60	60	45	60	60	60	60	25	15	35	15	35
Power:								AC. DC.	AC. DC.	AC. DC.	AC. DC.			
Tractive effort, starting†, lbs	48,000	40,000	33,500	35,500	37,400	26,800	55,000	20,000 24,000	20,000 24,000	25,000 25,000	36,000 36,000	43,800	57,500	50,000
Do., at 1 hr. rating, lbs.	.....	38,000	23,000	23,000	17,540	14,400	26,400	8,400 10,200	8,400 10,200	10,500 13,000	22,000 27,500	19,000	46,000	35,000
Do., at cont. rating, lbs.	.....	.....	5,700	5,700	.....	7,600	12,000	5,700 7,750	5,700 7,750	5,020 6,000	14,600 15,500	11,800	36,000	.....
Motors:														
Type	DC No. AXB-70	DC No. GE-65	DC. No. GE.-84-A	DC. No. GE.-84-A	2 DC. Nos. 103 & 129	AC. No. 144	DC. No. 315	AC. DC. No. 130	AC. DC. No. 130	AC. DC. No. 133	AC. DC. No. 151	AC. No. 137	AC. No. GEI-506	DC. No. GE-209-A
Rating h. p.: 1 hour	180	200	550	550	300 & 320	460	1,250	235 360	235 360	125 94	170 150	225	475	275
Rating, h. p.: continuous	.....	.....	230	230	.....	310	800	195 295	195 295	86 60	140 108	178	375	.....
Current per motor: starting	1,725	318	1,100	1,100	800	2,500	2,850	2,025 2,000	2,025 2,000	960 830	1,125 1,100	1,525	700	530
" " " 1 hour	.....	300	750	750	415 & 438	1,590	1,725	1,909 1,000	1,090 1,000	545 543	820 910	910	500	400
" " " continuous	.....	.....	325	325	.....	1,045	1,070	845 810	845 810	365 365	645 635	685	.....	.....
Voltage at collector	625	625	625	625	600	11,000	650	11,000 600	11,000 600	6,600 600	6,600 600	3,300	6,000	625
Voltage at motor	300 app.	625	625	625	600	275	650	220 300	220 300	235 150	220 150	235	500	625
Weight of each motor	.....	12,975	11,500	11,500	11,500	19,500	45,000	16,710	16,710	6,025	10,420	15,660	.....	.....
Weight of each armature	9,500	2,800	7,640	7,640	5,300	9,350	10,950	5,850	5,850	2,705	3,570	5,095	.....	.....
Gear ration	Gearless.	81 : 19	Gearless.	Gearless.	Gearless.	Gearless.	Side rd drv	Gearless.	Gearless.	72 : 17	79 : 17	85 : 16	4.28 : 1	4.37 : 1

* All figures under heading "Dimensions" have been given to nearest complete inch, neglecting fractions.
† Unless limited by characteristics of motors the starting tractive effort is calculated as one-quarter of the weight upon the driving wheels.

TABLE 11.—*Electric and Steam Locomotives. Comparison of weights and centers of gravity.*

	Electric.				Steam	
Type	0-4-4-0	4-4-4-4	4-4-4-4	2-4-4-2	4-4-2	4-4-0
Railroad	Pennsylvania.	Pennsylvania.	Pennsylvania.	N. Y., N. H. & H.	Pennsylvania.	Pennsylvania.
Reference to Table 9	5	6	7	9	..	..
Service	Experimental.	Experimental.	N. Y. tunnel.	Main line.	Main line.	Main line.
Total weight of locomotive, running order in lbs.	195,140	304,000	332,000	202,000	176,600	138,900
Height, center gravity, complete loco, from rail, in.	42.5	55	63.75	53	73	63
Per cent. of weight of running gear below springs to total weight.†	50	46.3	16.7*	37.4	22.7	22.7
Heights of center of gravity of running gear from rail, in.	28	33.5	30.2*	30	33	29

*Does not include motors as they are mounted in cab. †Including motors in the case of electric locomotives Nos. 5, 6 and 9.

show an operating saving of about one cent per car-mile, or, say, between 4 and 5 per cent. of the total operating cost.

ENGINE REPORTS USED ON THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD.

Owing to the demands on the space a few forms of engine reports were crowded out of the description of the organization of the mechanical department of the New York, New Haven & Hartford Railroad, published March 4. This omission did not detract from the completeness of the description of the organization, but the forms are of value for showing the final methods of keeping close track of the condition of the power. They are in the form of weekly reports to the mechanical superintendent from the several shops, the chief clerk of mechanical accounts and the master mechanics and are illustrated herewith. They consist of reports of the engines in the shop for repairs, engines condemned, engines rented, engines in service and reserve and the engines transferred from one division to another.

When an engine is taken into the shop, the superintendent reports the date on which he expects to be able to deliver it.

ENGINES IN SERVICE OR RESERVE.

	Engine No.	Location Division or Place in Service.	Class of Service-Days: Pass.	Freight.	Mixed.	Work.	Switch.	Helper.	Reserve.	Class Repairs Needed.		Engine No.	Location Division or Place in Service.	Class of Service-Days: Pass.	Freight.	Mixed.	Work.	Switch.	Helper.	Reserve.	Class Repairs Needed.
1											41										
2											42										
3											43										
4											44										
5											45										
*											*										
*											*										
37											77										
38											78										
39											79										
40											80										

Master Mechanic.

ENGINES TRANSFERRED.

Eng. No.	Division Transferred to	Delivered. Hour.	Delivered. Date.	Eng. No.	Division Received from	Received. Hour.	Received. Date.

M 127.

WEEKLY REPORT OF ENGINES, Week ending _____ 19

_____ Shops. _____ Division.

ENGINES IN SHOPS FOR REPAIRS.

	Engine No.	Division Received From.	Service.	Class Repairs.	Date Received at Shop	Date to be Ready for Service.	Date Turned Out.		Engine No.	Division Received From.	Service.	Class Repairs.	Date Received at Shop.	Date to be Ready for Service.	Date Turned Out.
1								16							
2								17							
3								18							
*								*							
*								*							
14								29							
15								30							

If this date is overrun he is asked to explain the reason for the delay. This naturally has a tendency to influence him to allow as much time as he can for the work so that he will be sure to make the delivery on or before the time set. If he shows an inclination to take more time than seems reasonable, he is asked to explain why so much is needed, which tends to make him shorten the time. The result is that, between these two influences, the estimate of the time required to effect repairs is usually very close and the locomotives are delivered on the schedule time. This report is made every week. At the bottom there is a list of engines whose date of delivery has been changed for reason, for of course delays do occur.

The other forms are self-explanatory, and are used to check off the locomotive record board in the office of the mechanical superintendent.

ENGINES CONDEMNED.

Eng. No.	Date Condemned.	Eng. No.	Date Condemned.	Eng. No.	Date Condemned.	Eng. No.	Date Condemned.	Eng. No.	Date Condemned.

ENGINES RENTED.

Eng. No.	To Whom Rented.	Location.	Delivered.		Returned.	
			Hour.	Date.	Hour.	Date.

ENGINES IN SHOPS, DATE TO BE OUT HAVING BEEN CHANGED TO LATER ONE.

Eng. No.	Explanation as to Cause of Later Date Being Given.

The Orient express between Paris and Constantinople, 1,933 miles—perhaps the oldest "limited" train in Europe—is to have its time shortened up. Something was done last year, when the time from Paris to Vienna, 861 miles, was reduced to 25 hours. The changes announced for this year reduce the time in the other direction to 20¾ hours. From Constantinople after April the train will leave at 7:15 p.m., Budapest (889 miles) at 6:50 a.m. (the second day), Vienna at noon, Munich at 7:44 p.m., Strasburg at 2:30 a.m., and reach Paris at 8:45 a.m. This requires but one night between Budapest and Paris (1,044 miles) instead of two as formerly. It is interesting to note that this much-talked-of long-distance train is so well patronized that it is regularly made up with *two* sleeping cars and a dining car! Of late a limited express between Ostend and Vienna, 822 miles, has connected with it, going by way of Cologne, Frankfort and Nuremberg. The average speed from Constantinople to Budapest will be 25 miles an hour; thence to Paris, 40 miles.

THE TRAINMASTER'S FUNCTIONS.

This composite chapter consists of paragraphs selected from the writings of Messrs.—

John T. Finerty,	Assistant Trainmaster,	Del., Lack. & West.
S. A. Covington,		Col. & So. Ry.
W. E. Burk,	Trainmaster,	Vandalia Line.
J. F. Russ,	Trainmaster,	Missouri Pacific.
W. C. Morse,	Superintendent,	Missouri Pacific.
F. C. Syze,	S. I. Rapid Transit and	Balt. & O. R.R.
W. H. Simms,	Vice-President,	Phila. & Western.
W. B. Gormley.	Trainmaster,	Pennsylvania.
W. F. Thiehoff,	Superintendent,	Chic., Bur. & Qy.
F. B. Turner,	Master of Trains,	Louisville & Nash.
F. E. Bolte,	Passenger Trainmaster,	St. L. Ter. R. R. Assoc.
C. K. Miller,	Trainmaster,	Cin., N. Or. & Tex. Pac.
V. R. C. King,	Trainmaster,	Atlantic Coast Line.
V. V. Boatner,	Trainmaster,	Yazoo & Miss. Val. R.R.
W. M. Wardrop,	Trainmaster,	Penna. Lines West.

PERSONAL QUALIFICATIONS.

An eminent railway officer once said that two positions most difficult to fill are those of track foreman and trainmaster. To become a good trainmaster one requires lusty health, a fair education, perseverance, patience, keen intuitions and an abundance of moral courage. He must be temperate, love work, possess a high sense of justice and a penetrating knowledge of human nature. He must have robust common sense, be imbued with high ideals and actuated by sound convictions. To every man is given an opportunity to do something worth while, but the life of a trainmaster abounds in such opportunities.

Health is the first requisite, for he must exercise intense effort and prolonged, persevering application, must bear frequent interruptions, changes and disarrangements of his plans;

must be prompt and fertile in resources and expedients to meet sudden demands; must calmly bear with irritating subordinates and superiors; must be able to lose sleep and have ability to keep a-going for long periods. He must possess in a high degree the genius of adaptability in order to meet every possible emergency. Furthermore, he must have the courage to exercise all his authority, and he must not only know, but he must know that he knows. Doubt and vacillation can have no part in the personality of a successful trainmaster. He is the man of trained intelligence who plans the work, but he must also find the men and qualify the men to do the work. Ill-health breeds bias and prejudices and it prevents one from judging men, their motives and actions dispassionately and fairly; consequently, one in ill-health is not qualified to form proper conclusions as to the worth and qualities of men in employing them, nor can he have the balanced temperament that is essential to fair and impartial decisions in investigating cases and imposing discipline upon employees.

The writer was assistant to a trainmaster who suffered from attacks of gout, when he would be absent from one to four weeks at a time. On his return, while the demons were chasing each other through his system, he would pass upon the accumulated cases of discipline and at times would impose thirty suspensions in thirty minutes. It was impossible for him to acquaint himself with the conditions and relations of each case, therefore he was unconsciously unjust to the men involved, for without knowledge justice is impossible.

An ideal trainmaster is a man who has served several years as train despatcher and chief despatcher, as those duties carry certain qualifications and experience in the operating department not easily gained in any other manner. His being a telegrapher will be of great assistance to him when out on the road, as he can get much quicker action than any man who has to do his talking through an operator.

He should be old enough to have mature judgment, not easily influenced by stories the men on the road will tell him about the despatchers' office, and at the same time be able to pick out any good suggestions that may be made to him by the men.

He must be able to discern the probability of truth made by persons on trial, or interested in investigations, as at times the parties greatly interested will not always state the facts.

If a man [of the right character] has had eight or ten years' experience in the transportation department, and this before reaching the age of thirty, and if he assumes the responsibilities of the office by the time he is thirty-five, we have the basic material for the making of a first-class trainmaster.

He should get an early start, for the reason that there is much to learn which can be gained only by practical experience. He must also have earnestly aspired to the position, which is an indication of the necessary ambition. You cannot make a first-class trainmaster; he must make himself.

His knowledge of the rules and regulations should be beyond question. The more thorough his knowlege of the fundamental principles of train operation the greater will be the respect in which he will be held by his subordinates, for men in the ranks quickly detect their superiors' weak points, and not a few hasten to take advantage of them at every opportunity.

If the chief train despatcher be chosen for the position of trainmaster, he should spend his days and nights on the line in the thickest of the train work, rub shoulder to shoulder with the tried men in the ranks and keep an open mind for the hints such men give by their actions and methods of working, until he has mastered the details of field work.

Since a large percentage of trainmasters become superintendents, and thence are frequently promoted to still higher positions, the educational qualification, whether self-obtained or otherwise, is an essential which must be taken into consideration. The ever-increasing tendency of railway work to a more scientific standard demands this. I know several men whose experience I envy, but who have never risen above a certain grade because of their lack of a good general education. The young men who are occupying positions from which trainmasters are chosen should strive to their utmost to educate themselves on as broad lines as possible.

A man promoted from the despatching department should have some experience in train service, as it will save him from learning this after being made trainmaster. A man not experienced in train service is not in a position to at all times render fair discipline, for no matter how fair-minded he may be his lack of knowledge in this direction may cause him to give a decision which would not be considered fair to an experienced trainman.

While it may not be regarded as actually essential it is certainly of considerable practical advantage if he is able to determine, from personal knowledge, when a locomotive is being efficiently fired or handled.

He should be familiar with at least the simpler rules and practices pertaining to maintenance of way and structures, and should have some knowledge of accounting to enable him to assemble and move traffic economically. He need not necessarily have special training in either of the three branches or departments last named, but can pick up a fair working knowledge of them, if he has interest enough, and if he maintains friendly intercourse with men in charge of those departments.

The individual who is ambitious to succeed should not tie down to one branch of the service, but should be alert and watchful of all things in whatever department in order to fit himself for emergencies and overcome obstacles.

He should never lose sight of the need of thoroughly equipping himself for any emergency, and should be ready at a moment's notice to represent his company at any meeting wherein the transportation department is interested. The proceedings of the various associations of railway officers, their rulings and disposition of cases brought before them should be well known to him. The conditions of interchange at the various junction points, per diem, and, in fact, every item pertaining to the increased revenue accruing from the prompt movement of cars should be thoroughly understood.

A trainmaster with the bulletin habit is always productive of dissatisfaction in the train service, and particularly if he feels it necessary to reissue instructions periodically. An order once issued remains in effect until its purposes have been accomplished or it has been recalled; and to repeat it advertises the failure on the part of those whom it affects to observe its provisions and a lack of proper supervision on the part of the official charged with enforcing it.

OFFICE WORK.

Usually when a practical man is first promoted to the position of trainmaster he finds it rather difficult to write his views and ideas. He is able to tell you all about it, but to express it in writing is hard on him, and truthfully so, for his former occupation was not devoted much to writing. This is the obstacle he should try to overcome before embarrassing circumstances arise.

I remember the first report I dictated, or rather tried to dictate. I signed my name under the title "trainmaster," instead of between it, and "yours truly." I really thought it was all right. Describing the details of my work on paper was my most difficult duty, but I grasped every correction in my sentences until it became easier for me. A man so situated should observe closely the language of his superiors, read during his spare time and study the reports of others who have had better opportunities. Some day he is liable to be delegated to represent the superintendent at a meeting or conference, and he should be able to represent him well. This is one of the most important elements that make him first class.

A first-class trainmaster should keep his office in his hat if he is anxious to produce the results expected of him. In other words, he should be continually out nosing around, figuring on changes that will effect improvement and getting them in substantial form for consideration at the next change of time-

table. The management is always looking for increased service with less expense. A trainmaster who thinks he can familiarize himself with the many complex details of an up-to-date railway by transacting his business from the office makes a serious mistake.

He should have access to all reports sent to the superintendent pertaining to the movement of trains, so that he will be in touch with what is going on and in position to apply the proper remedy without having the superintendent bring the matter to his attention, which, at times, to say the least, is embarrassing.

See that your clerk is a capable man, and under no circumstances allow your correspondence to be neglected. Requests for replies to telegrams and letters are embarrassing to you and may be to your superior, as he may be waiting upon information from you before he can advise his superior.

Take a good railway paper and study it. Inform yourself thoroughly, bearing in mind that promotions come to those who are qualified. Be loyal to your superior. His success is your success.

EMPLOYING NEW MEN.

Few realize the splendid opportunity open to them in the employment of men. The pressing need of the moment often serves as the excuse for admitting undesirable men to the division. Then follows not only an increase in car damage and property loss, but also a general disaffection. With the general recognition by the railway companies of the employees' organizations and the right of their committees to have a hearing, it becomes hard to get rid of unworthy and incompetent employees. In admitting men to the service temporary inconveniences in order to make a discriminating choice is therefore better than immediate relief at a heavy later expense.

It is imperative on the trainmaster to select clean, wholesome, well-disposed men, who are fit to associate with decent men. While a passenger conductor the writer was stirred with a sense of shame and indignation because of a few common, drunken, vulgar counterfeits of men who held equal rank in the service. The appointment of such men as passenger conductors was an insult to every self-respecting man in the service and a disgrace to the company who employed them. The writer was once given a man as passenger flagman who had been discharged from the U. S. Army, afflicted with chronic asthma, but as he was a brother of a train despatcher, the trainmaster employed him as a passenger brakeman and afterward made him flagman. The poor fellow was about as fit to run as he was to fly, and he was absolutely unfit to be trusted with the protection of a train in a snowstorm. The sympathies of the trainmaster were commendable, but they should not have overruled his judgment and inflicted upon the service a man who was incompetent.

All employees who are hired and examined by your department should be examined by you personally, and this should never be left to your clerk.

The employment of trainmen should be done by the trainmaster personally and not left to a clerk, except when there is a regular employment bureau.

He will do well to work on the principle that he is employing conductors and engineers, as each brakeman or fireman employed should be eligible for promotion. The best results will be got from men who live on the line of road, and it is best, as a general rule, to employ inexperienced men and train them. The following order in employment of brakemen will hold good:

1. Men who have had some experience as a car repairer or inspector. Such men will have a knowledge of equipment and will be more careful than a man with no knowledge of the dangers from this source.

2. The brakeman or conductor from small roads in the same locality. Such a man moving from a small to a larger road will feel that he has something to learn and will go at it with enthusiasm.

3. Section men of sufficient education who have been found to be honest.

4. Station helpers, freight checkers or handlers. Such men will be especially adapted for local freight service.

5. Men of character off adjoining farms who have sufficient education.

6. Any other, in preference to the experienced "rounder," who will start some kind of trouble before he gets settled.

All men employed should have a fair education and be able to write a legible hand, as a great deal depends on being able to make legible records. Men of families are, of course, preferable.

RELATIONS TO SUPERIORS.

Be loyal to superior officers. Confer with them on all matters of importance and profit by their suggestions and experience. I once knew a trainmaster who made a dismal failure and disorganized a division by suggesting to employees in his department who had been disciplined that the old man had decided to do so-and-so, but in his opinion it was too severe. He not only lost the respect of the trainmen, but created endless dissatisfaction among them and was finally reduced.

Never pass papers to the superintendent with the words "please note" or "herewith report of so-and-so," or "I attach result of investigation of accident to so-and-so," without explaining in detail just what was brought out by the investigation and summing up the evidence as a lawyer would present his case to a jury.

Never fail to ask the superintendent for what is needed to properly handle the division in the way of additional help or facilities, and be just as ready to reduce the forces when it can be done.

It is the practice on many roads to require trainmasters to ride all special passenger trains, trains carrying officers' cars and trains hauling important freight, etc., and the writer has known of instances where a trainmaster had instructions to ride more than one train at the same time. The efficient trainmaster does not need, and should not be given, positive instructions as to his movements, but should be kept posted regarding important movements and allowed to control his own plans. He will have sufficient judgment to do the proper thing.

A good chief despatcher is the most important official a superintendent can have, and he can make and save more money than any other subordinate official in the service.

He should work in closest harmony with the trainmaster, as the success of one depends greatly on the other. He should be equal in authority with the trainmaster, although he is the most important necessity of the two. Chief despatchers should go over the road frequently and inspect and supervise station and telegraph service, and should have sufficient force to allow this without crippling the service.

The trainmaster must be a defender of his superior officers and their policies; he must, for instance, know how to assuage the injured feelings of the station agent, as well as patrons, who can see no good reason for the further postponement of the proposed new station building to take the place of the present "buzzard roost." He must get in behind the roundhouse force at the point, for instance, where only the canopy of heaven serves for a roof, and, instead of joining the chorus of knockers, endeavor to convince them that there are good reasons, and give them the reason, if possible, why such conditions are not remedied. He must always be alert to allay, if possible, the friction between employees or departments, keep after the knockers, point out to them the futility of knocking, how it impairs the service and how infinitely more it impairs the knocker.

He should be so thoroughly familiar with every portion of his division that he can say off-hand whether or not a new idea is worth trying out. It is the man who studies conditions and tries to adopt or change practices that will effect economy for the company and reflect credit on his superiors that is valued.

He should keep in pretty close touch with the maintenance of way department, and heartily co-operate with it in all changes that affect the handling of traffic.

While you are essentially a transportation officer, yet you should familiarize yourself with the workings of your allied departments—the mechanical and maintenance of way—keeping your eyes and ears open for pointers that will be of great benefit to you in the future—perhaps in a few days. Whenever you see conditions in other departments that should be corrected, do not hesitate to call the attention of the division heads to them, and, if of importance, the attention of your superior also. Disasters have been known to be averted in this manner. Work closely and in harmony with other departments, as friction between heads of departments never resulted in good for any company.

RELATIONS TO SUBORDINATES.

Invite suggestions and weigh each one carefully. Do not have "Private" stenciled on your door in "box car letters."

I remember quite well, when I had only been trainmaster a short time, a conductor came to the office with a letter that I had written censuring him for an error in judgment, and said: "You can certainly write the most sarcastic letters of any official I ever worked under." I asked him to sit down and we would read the letter and discuss it. We did so, I explaining my views and intentions when writing the letter, and he his interpretation of the meaning. It so happened that he received the letter after making a hard trip on short rest and when he had been without a square meal for twelve hours. He felt that he had a grievance anyway, and the criticism was the finishing blow. I asked him to take the letter home with him and get a good rest and have his wife cook him a good meal and then sit down and read the letter while he smoked. The result was he came back next day and said: "Well, that letter wasn't so bad to take on a full stomach." However, the incident put me on my guard and taught me to thereafter use such language in a letter as would explain to the offender his violation and suggest a remedy without offending the most sensitive.

Another thing I found a necessity. Never criticize an employee in the presence of another. If anything goes wrong suggest some remedy to the individual at the time and then ask him to come to the office and go over the matter thoroughly. Listen to his explanations and weigh them carefully, deciding the case after considering conditions and circumstances and administer discipline necessary without humiliating the employee before any other employee. Especially does this refer to passenger employees, for two reasons: One, the traveling public should never be allowed to overhear discussions of failures to properly perform, and the other, passenger employees should give their entire attention to the handling of their train and administering to the needs and comforts of passengers on the train. Many a man has sacrificed his position to retain his self-respect as he saw it from looking at one side only.

He must have the knack of teaching the things best suited to the service on the particular railway or division of the railway on which he is employed and have his instructions carried out by employees in his department, teaching them loyalty and interest in their work that they may bring success to the operation and credit to themselves and the officers of their division and system. To do this he must first have the confidence of employees in his ability to teach, and be firm in requiring each individual to give particular attention to the details of the work. If the little things that seem unimportant to the individual are watched closely and the attention of each employee is called to the violation of rules and instructions promptly and courteously, failures explained at length, suggestions made as to how to avoid a recurrence and the responsibility of each clearly defined, he can in a short time find out the competent, careful and conscientious employee as well as the careless and unscrupulous.

You should know each of your men by name; study them individually so as to know their weak points. Always greet them pleasantly, calling each man by name every time you meet, and whenever an opportunity presents itself (in a friendly conversation, if possible), relate experiences or anecdotes that show up the weakness of others, that will show the person spoken to his own weak points and will set him to thinking, and thus do more good than to attack him direct. Show them the importance of being always vigilant for the welfare of the company; teach them that whatever is to the company's interest is to their interest; to make friends of all of the patrons by impressing upon them how glad we are to get their business. Make them understand that it will not do to violate rules in order to accommodate anyone asking a special favor. In refusing, it should be done in a quiet, gentlemanly manner, explaining why their request cannot be granted. When on the road with trainmen make yourself one of them by helping to do their work whenever an opportunity presents itself. This will show them that you know how and can do the work yourself; will prevent shirking or offering flimsy excuses when their work does not come up to your requirements. When they make a wrong move, let them finish it their own way (if not too far wrong, and then show them how it should have been done. Discuss it freely so as to show that your only object is to get it done in the best and quickest manner.

Keep a watch over enginemen. See that they do their part of the work properly. In a friendly manner call their attention to improper whistle signals, especially as to the abuse of blowing too often and too long. Call attention to the misuse of air-brakes.

Care should be taken to see that all train and enginemen get sufficient rest and plenty to eat. I have fed quite a number of train and enginemen when on long runs, often doing the cooking myself in the caboose while they were doing their station work, and when the next station was reached they worked like new men; and thus (the most important point) you get close to men.

At Christmas time try and show your trainmen some special attention, such as annulling local freights, arranging call of slow freights so as to let as many as possible be at home for dinner. If practicable, make them some inexpensive, useful present, such as memorandum books or time-table holders.

Labor organizations have come to stay where they are led by intelligent, conservative men, and will abide carefully by all agreements entered into. They are a benefit and not a hindrance and greatly simplify the matter of handling large bodies of men. It is true that all labor organizations do not meet these tests, but the railways are fortunate in having to deal with some of those which do come up to the highest standard of reliability; whose representatives not only speak fully for their constituents, but can also be of inestimable benefit in preventing misunderstandings by disseminating clear, accurate information on their part to the men.

Wnere the discipline is so thorough that the official dignity of the officers is not lessened by very close and friendly contact with the men, and where the men have well-developed *esprit de corps* and faith in the integrity of their superiors, it is possible to deal with the men through their representatives on subjects tending toward progress and efficiency.

A sore place in a man's heart heals but slowly.

Be very slow about discharging anyone unless for drinking or insubordination (which must never be tolerated), realizing that discharging an employee, especially a man of family, makes him move, breaks up his home temporarily and works a hardship. But when absolutely necessary to discharge a man, help him to get a position on another road.

When a man is careless and not giving desired results, call the man to the office and have a heart-to-heart talk with him, showing that his position depends wholly upon the service rendered, and put it up to him to improve or be dismissed.

Such handling will, if the man be the right kind, bring him out. If he is not the right kind of a man, he should be dropped from the service, as no trainmaster can afford to carry any dead material in the machine.

Endeavor to employ young men with good education and good habits, and turn down every young man for a position with the cigarette signs on his fingers.

New men who have had no experience as brakemen should be placed with the best conductor to learn the road and duties of a brakeman, and should be required to remain with him for a sufficient time to get the foundation for the rules of carefulness and safety. They should not be crammed full of long-winded lectures, but allowed to learn from observation and experience. After they have got a start in this way they will then be benefited by short talks from the trainmaster, on a few subjects at a time, and the trainmaster will usually be able at this time to determine whether or not he has the right man.

Make it a rule to observe seniority in promotion where merit and ability are nearly equal. Make it as far as you can worth while for the men to stay, remembering that continual changes in the personnel are costly, and the valuable men are the stayers. When it does become necessary, on account of greater ability or merit, to put a junior man in a preferred position, take the pains to explain to the senior man why. Come out in the open and be frank and honest with your men. There is no virtue which will win the respect and admiration of men like that.

Always bear in mind that in the ranks are specialists, so to speak, in their different callings, and that a man who is proficient cannot be fooled by one who is not. The trainmaster makes a mistake when he starts off with the idea that because he ought to know more than he does he must make others think so. This is not an uncommon mistake. It is fatal, for he fools no one but himself, and loses the respect of his men. He also loses the chance for acquiring knowledge in which he is deficient.

Loyalty is a reciprocal proposition; you must pay the price for it, not only in wages, but in just treatment. A sort of dogged obedience may be enforced for a time, but that is not loyalty, and without loyalty good service is impossible. You may be able to make a man submit to an injustice, but you can never convince him that it is right to do so. It is just as necessary to sow the right kind of seed for loyalty as it is to plant corn for corn, or cotton for cotton. Men cannot be loyal and discontented at the same time, and they will be discontented while injustices are practised.

See to it that under ordinary conditions the forces are sufficiently recruited to allow a reasonable percentage of extra men, so that requests to be absent from duty may be readily granted when made in the proper manner. Consideration should always be given to all reasonable requests, for experience has proved that where the extra list is not large enough to permit the days off as requested, not a few men will take the chances of reporting "sick" or of resorting to some other subterfuge which has a demoralizing effect. On the other hand, I have known cases where these bad effects have been entirely eradicated when the men learned that there was a sincere effort made to grant all reasonable requests.

Particularly meritorious service by a subordinate should have proper recognition, and where the entire organization acquits itself with more than ordinary credit under adverse conditions, cause the fact to be made known in order that assistants of all ranks may have a share in the general satisfaction.

A trainmaster must be honest throughout, for a man is known by the promises he keeps. Therefore, he must be guarded about making promises or anything that can be construed as a promise. It requires courage sometimes to say "No," but it is better than to delude one with false promises. Associated with real honesty is courtesy, and real courtesy springs from the heart. The greatest lie and the one most believed is the superficial adage that "Courtesy costs nothing." It costs a great deal. Cheerfulness is essential, helpful, and thrives by diligent cultivation. It is the element most conducive to the best individual and team work, for it lubricates all the relations and activities of life. A grouchy, grumpy, disgruntled trainmaster will have a seething streak of hell running through all the ramifications of a division, for bad dispositions are as infectious and as pestilential as smallpox, and on a railway they are as demoralizing as whisky—ruinous to business and individuals.

Be as ready to defend men against injustice or harsh discipline as he is to enforce observance of rules, because railway men, particularly those who have to deal with the public, are frequently subjected to insult when they cannot defend themselves, and are not infrequently unjustly charged by inconsiderate people with offenses of which they are not guilty.

The trainmaster can do more than probably anyone else to preserve the team play of the organization. Besides being a member of the superintendent's team, he is, of course, captain of his own team—a kind of 'varsity scrub, as it were. His team is made up of assistant trainmasters (if any), yardmasters, trainmen, yardmen and clerks. He must see that they play the game and they will be ever watchful to see how he plays his part on the big team.

RELATIONS TO THE PUBLIC.

In dealing with the public the trainmaster has unlimited possibilities for good or evil. A large portion of the public have a tendency to resist railway instructions. A privilege once extended to the public is almost impossible to withdraw. It is claimed as a right. People are so imbued with the idea that the railways discriminate; that the slightest inadvertent privilege to meet some local condition may cause embarrassment at points far removed. It is therefore, best for any trainmaster to understand the legal aspect of all questions affecting the public before he renders any decision, to the end that his orders may be in accordance with the law. If he follows this course he will save himself many unpleasant situations and the company much hostile criticism. The greater his knowledge of all laws, both federal and state, which concern a common carrier, the greater his efficiency.

The trainmaster has occasion to handle diplomatic matters with the smaller stations and firms, and should therefore enlarge his acquaintance as much as possible along the road. In this way he can frequently render good service to his company. He should be in close touch with the agents and see to it that they place the company in the proper light before the public.

Have very little to say to newspaper reporters, but endeavor to keep in such close touch with shippers and patrons of the road, so that they will come to the trainmaster with their complaints instead of taking them up with the president.

When out on the road agents and customers with whom you will come in contact, will raise questions which are entirely out of your department—questions with which you are not familiar and cannot satisfactorily answer. See to it that you make a note of these; either find out about them, so that when next in the vicinity you can explain; or else see that someone connected with your road in the proper department makes a personal call and gives the desired information. You can make or lose a friend for your company by attending to or neglecting it.

(To be continued.)

On taking possession of the Gotthard Railway it was necessary for the Swiss government to negotiate with Germany and Italy, which made large contributions towards its construction, as it forms the chief channel of communication between those two countries. They have agreed to limit the through fares to 1.614, 2.26 and 3.23 cents per mile for the three classes, respectively, and to make a reduction in the through freight rates. These have been higher than on adjacent and connecting railways, by a percentage allowed on account of the great cost of the work. They will still be higher, but the percentage is reduced.

General News Section.

The New York Central is preparing to introduce telephones for train despatching on the Ontario and the St. Lawrence divisions.

The Chicago & North Western has increased the pay of its telegraph operators. A press despatch says that those in towers will be advanced $5 a month; station agents $10 to $12.50, and all other operators from $2.50 to $5.

The New York State Public Service Commission, Second district, has ordered the Delaware, Lackawanna & Western to send in corrected reports of passenger train movements for the Buffalo, Syracuse and Utica divisions for the five months, September to January, the reports which have been sent being found unsatisfactory.

A bill has been introduced in the legislature of New York at Albany amending the law so as to give to persons who have suffered loss or damage at the hands of a railway a lien for reparation in all cases where his injury was due to the negligence of the railway; this lien to take precedence over the claims of all other persons or interests.

The Cunard steamship Mauretania, on her last westward trip, arriving in New York Thursday evening, March 17, surpassed all previous westbound records over the long course, making the run from Daunt's Rock, Queenstown, to the Ambrose Channel Lightship, New York, in 4 days, 15 hours, 29 minutes, the average speed being 25.91 knots an hour. The best previous record, 26 minutes longer, was made by the Mauretania last July.

The question whether Benjamin Thomas, John C. Fetzer and Charles R. Kappes committed the real estate frauds alleged against them by the board of directors of the Chicago & Western Indiana may be submitted to arbitration. A full statement of the allegations made by the directors of the Western Indiana in the civil proceedings brought by them against Messrs. Thomas, Fetzer and Kappes was given in the *Railway Age Gazette* of January 28, page 197. The state's attorney for Cook county, Illinois, refused to take the case before the grand jury and, therefore, there will be no criminal action. The proposed arbitration would be to determine the civil liability of Thomas, Fetzer and Kappes to the Western Indiana.

On recommendation of the Interstate Commerce Commission the President has awarded medals for heroism to George Karsten, of Milwaukee, and Robert Brendle, of McKeesport, Pa. Mr. Karsten is a switchman of the Chicago & North Western. On the afternoon of September 29, at Allis (Milwaukee), he risked his own life in endeavoring to save a woman who started to cross the railway where there are 20 parallel tracks. A string of freight cars cut off her view, and when she reached a point directly in the way of an approaching engine, becoming confused, she stopped. Seeing her danger, Karsten ran to her assistance, but the woman did not comprehend his intentions and struggled with him until the engine struck them and she was fatally injured. Karsten, however, fell wholly between the rails and the tender passed over him, but he was not seriously injured. Application for a medal was made on behalf of Mr. Karsten by officers of the Chicago & North Western. Mr. Brendle is an officer on the police force of McKeesport. On October 26, at the crossing of the Baltimore & Ohio, where 9 parallel tracks cross the street at grade, he saved a woman who started across the tracks just as a freight train was rapidly approaching. Her head was covered and she did not see the oncoming train. Officer Brendle shouted to her, but she was a foreigner, not speaking English, and did not heed the warning. Brendle, seeing that the woman continued, ran to her, grabbed her about the waist and carried her off the track. The train was so close that the pilot beam of the locomotive brushed against the officer's body. The application in this case was made by the mayor and the chief of police of McKeesport. The President has written personal letters of commendation to accompany the medals.

Brown's Discipline on the M., K. & T.

Trainmen and enginemen on the Missouri, Kansas & Texas are now disciplined without suspension. The rules went into effect March 1. In general they are like those on most other roads where Brown's discipline is in force. Each employee will be entitled to 60 demerit marks before dismissal. For each six months of perfect record employees will receive a credit canceling 10 demerit marks; for one year's perfect record employees will receive a credit canceling 25 demerit marks; for two years of continuous clear record employees will receive a credit canceling all demerit marks. Employees will also be given credit on their records for deeds of heroism and loyalty, for good judgment in emergencies and for valuable suggestions. Record bulletins will be issued monthly by superintendents and master mechanics covering employees in train, yard and engine service. Such cases as appear advisable to publish, especially those in which there was a doubt in the minds of employees at fault as to what course they should have pursued, will be included. Credits for extraordinary service will be included in record bulletins.

Illinois Commission on Employers' Liability and Workmen's Compensation.

Governor Deneen, of Illinois, has appointed a commission to study the subject of employers' liability and workmen's compensation. It consists of six employers and six representatives of labor, and is to present a draft of an employers' liability law to the governor by September 1, 1910. The members of the commission representing the employers are as follows: Ira G. Rawn, president Chicago, Indianapolis & Louisville, Chicago; E. T. Bent, secretary Illinois Coal Operators' Association, Chicago; P. A. Peterson, furniture manufacturer, Rockford; Charles Piez, president Link Belt Machinery Company, Chicago; Mason B. Starring, president Northwestern Elevated Railroad, Chicago; Robert E. Conway, manufacturer, East St. Louis. Those representing labor are: Edwin R. Wright, president Illinois State Federation of Labor; George F. Golden, business agent Packinghouse Teamsters' Union, Chicago; M. J. Boyle, Switchmen's Union of North America; John Flora, Carpenters' Union, Chicago; Daniel J. Gorman, Street Car Men's Union, Peoria; Patrick Carr, United Mine Workers, Ladd.

New Railway Law in New Jersey.

The legislature of New Jersey has passed and sent to the governor a public utilities bill. The present railway commissioners, with salaries advanced to $6,000, will become the Public Utilities Commission, and will have power:

To require every public utility to comply with the laws of this State relating thereto and to perform the public duties imposed upon it thereby.

To require every public utility to furnish safe and adequate service.

To require every public utility to keep its records so as to afford an intelligent understanding of the conduct of its business, and to that end to require every such public utility of the same class to adopt a uniform system of accounting.

To direct any public utility found to be granting rebates or other unjust, unfair and unreasonable discriminations to immediately cease therefrom.

The issue of corporation stock is regulated as follows:

No issuance, sale and delivery of its stock or of securities authorized by it and maturing more than twelve months from the date thereof, by any public utility, shall be valid until approved by the board. It shall be the duty of the board to approve of any such proposed issuance, sale and delivery of stock or securities, maturing more than twelve months from the date thereof, upon being satisfied that said proposed issuance, sale and delivery is to be made in accordance with the provisions of law relating thereto. No lease of its prop-

erty, rights and franchises by any such public utility, and no merger or consolidation of its property, rights and franchises by any such public utility with the property, rights and franchises of any other such public utility shall be valid until approved by the board.

Certificates of public necessity and convenience are required; and no privilege or franchise granted to any public utility by any local, municipal or county governing body shall be valid until approved by the board.

Transporting a Heavy Casting.

A unique method of transporting a large casting, much heavier than the capacity of the car on which it was loaded, is shown in the illustration. On two occasions recently such castings have been successfully transported from the Openshaw Works, Manchester, England, of Sir W. G. Armstrong, Whitworth & Company, Ltd., to the Middlesbrough Docks, for shipment to Japan. Although each of these castings had the unusual weight of 77 tons, they were each loaded on one of the Great Central Railway's 50-ton cars, and the excess weight was distributed over two other vehicles by means of the cantilever arrangements shown. The leverage was worked by means of a number of oak beams attached at one end of the vehicle carrying the load, and at the other end heavy weights were suspended and swung over small well cars without being in any way attached thereto. The counterbalance weight at each end was about nine tons, and the oak beams were each 2 ft. square cross section; each of the sets had an approximate weight of about 11 tons. The levers were not equally placed on the cars carrying them, and the leverage was assisted by the greater length being extended over the small cars at each end. In addition to the load there were five tons of packing, making a total load of 82 tons, so that a weight of 16 tons was required to be taken off each truck. Besides the 50-ton car there were used two armor plate cars, each of 40 tons capacity, and two small well cars for underrunning the balance weights. Some years ago a casting of 90 tons weight was safely transported in this manner from the Openshaw Works to Liverpool.

Transporting a Heavy Casting on an English Railway.

Railways Not Opposed to Canal.

That statement by Admiral Evans is not true. Not a railway in this country has done anything to interfere with the progress of the work on the Panama canal. Mr. E. H. Harriman, shortly before his death, told me that the railways in which he was interested would welcome the completion of the canal. He said that if freight could be carried from the Pacific coast to European ports at a lower rate by way of the canal the transcontinental roads would benefit by it.

Is an adequate return to be brought to this country for the vast expenditure on the building of the canal? is a question often asked. I would say that the return will come in time. But the immediate good of the canal will be felt first by other countries. The United States has no commerce to-day except her coastwise commerce. Protection has done this. When the Panama canal is completed there will be two routes to what has long been known as the East.—*J. F. Wallace.*

Disastrous Derailment at Green Mountain, Iowa.

In a derailment of a passenger train on the Chicago Great Western at Green Mountain, Iowa, early on the morning of Monday last, 42 passengers and five trainmen were killed and 40 passengers were injured. A day car and a smoking car, which were the third and fourth from the front of the train, were completely wrecked, and nearly all of the victims were in these two cars. The train, consisting of two engines and 13 cars, was one of the Chicago, Rock Island & Pacific running over the Chicago Great Western because of a blockade on the line of the Rock Island. The two engines hauling the train were both running backward, and the press despatches say that the speed was about 25 miles an hour. The tender of the leading engine jumped the track in a cut and was quickly ditched, falling into a bed of soft clay at the side of the road. The engine thus became an almost immovable obstruction, and the second engine and the first three or four cars were piled up in a very bad wreck. The first car in the train was a heavy sleeping car, and, the next two cars being lighter, the sleeping car suffered comparatively little damage. The smoking car, the second back from the sleeping car, was so completely crushed by the sleeper that none of the upright members of the car body remained standing.

Award in Brotherhood of Railway Trainmen Arbitration.

The Illinois Board of Arbitration rendered an award on March 18 giving the switchmen in the Chicago district who belong to the Brotherhood of Railroad Trainmen an increase in wages of 2 cents an hour. The men asked for an advance of 5 cents an hour.

The scale recommended by the board is as follows: Yard conductors, days, 37 cents an hour; nights, 39 cents an hour; yard brakemen, days, 34 cents an hour; nights, 36 cents an hour. One argument offered by the representatives of the employees for an increase in their pay was the hazardous nature of their work. On this phase of the matter the board said:

"The board recognizes the impossibility of adequately measuring risk in cents of compensation per hour, and, in its opinion, the solution lies rather in developing a means which will result in a reduction of risk than in determining adequate compensation in wages. Such means can best be developed through the operation of an employers' liability act, under which both employer and employee will share the burden of the risk and under which both will co-operate to reduce the sacrifice of life and limb which present conditions involve. The board therefore looks forward to the law which the recently appointed employers' liability commission is to present as a more just and humane solution of the question of hazard."

The employers' liability commission referred to has been appointed by the Governor of Illinois.

A good deal of testimony was introduced regarding the cost of living. Much of this related to the general price of products prevailing in January, 1910. The board said that the prices prevailing in that month were seriously affected by the severe climatic conditions and should, therefore, be considered of but temporary influence on the cost index.

The demand of the men for time and a half for overtime was not granted. The board said in part:

"Conditions in the transportation service differ from those in a shop, or in the building trades, in that overtime cannot be readily and completely controlled. Weather conditions, density of traffic, unexpected breakdowns at points lacking facilities for prompt repairs may, either singly or together, cause delays to such an extent that a run, which under reasonably favorable conditions takes 10 hours, may be protracted to 14 hours. In such cases the crew is not called upon to perform 40 per cent. more labor, as would be the case in a shop, but is required to spend 40 per cent. more time in performing the same amount of labor. To that extent, therefore, the railway company is already penalized for the delay, and it does not seem proper to the board that in the transportation service further pecuniary penalty shall be assessed."

It recommended, however, that 10 hours be made the maxi-

mum day's work. Heretofore, the only general limit placed has been that imposed by the 16-hour law. The rule recommended is as follows:

"Ten hours, or less, shall constitute a day's work, and the duties assigned to each crew shall be such as not to require a longer day's work under average conditions. No new work shall be assigned after the expiration of 10 hours, nor, excepting in cases of emergency, shall any new work be assigned shortly before the expiration of 10 hours, if such assignment shall cause the men to work overtime.

"Yardmen will be paid pro rata for overtime. Anything less than 30 minutes of any hour will be paid for as one-half hour; anything more will be paid for as one hour."

The third point involved in the arbitration was the demand of the employees that all men taken out of service for cause should be given a hearing within three days. The board grants a hearing within five days, and if hearing is delayed longer the employee will be paid his regular pay during the period of delay. Employees will have the right at such hearings to be represented by fellow employees to be chosen by them and, should the decision rendered be unsatisfactory, the right of appeal to the higher officers of the railway.

Both the representatives of the railways and officers of the Brotherhood of Railway Trainmen expressed themselves as dissatisfied with the award, but both announced that they would accept it.

Increased Pay for the Switchmen's Union at Chicago.

An increase of about two cents an hour in the pay of those yard switchmen in Chicago who belong to the Brotherhood of Railway Trainmen, was announced on March 18, as noted under another head in this paper. On Tuesday of this week it was announced that switchmen belonging to the Switchmen's Union of North America had been awarded a larger increase; three cents an hour in most cases. The B. R. T. controversy was arbitrated by the Illinois State Board of Arbitration, and one of the principal reasons for not making the increase larger was that the increase in the cost of living was not so great as had been claimed by the switchmen. The Switchmen's Union controversy was arbitrated by a board consisting of C. R. Gray, vice-president of the St. Louis & San Francisco, representing the railways; S. E. Heberling, vice-president of the Switchmen's Union, and S. C. Gregory, selected by the federal arbitrators. Switch tenders and signalmen in towers are awarded $5 a month increase, but the demand for an increase in the pay of assistant yardmasters was rejected. It is said that the officers of the Brotherhood of Railway Trainmen will now appeal to the roads to pay the higher rate; and if this request is not granted, will give the 60 days' notice required by the Illinois statute that they wish to repudiate the agreement which has just been made. The increase now decided on is to take effect as of February 10. The roads affected are: Chicago & Eastern Illinois, Chicago switching district; Chicago Great Western, entire system except St. Paul and Minneapolis; Chicago, Rock Island & Pacific, Chicago Terminal Transfer, Lake Shore & Michigan Southern, yards only; Michigan Central, west of Detroit; Pere Marquette, entire system; Wisconsin Central, Chicago switching district. The arbitrators, while unable to reach a precise conclusion, believe that the cost of living has increased in Chicago since 1906 about 25 per cent. They believe that switchmen in Chicago, when working full time, now earn about $85 to $100 a month. It is understood that the hazards of the work was one element which led to the award of a rate higher than that awarded in the B. R. T. case.

The roads on which the Brotherhood of Railway Trainmen control the switchmen and where the lower rate applies, are the Santa Fe, the Belt Railway, the Baltimore & Ohio, the Chicago & Alton, the Chicago, Milwaukee & St. Paul, the Chicago & North Western, the Chicago, Burlington & Quincy, the Chicago Junction, the Erie, the Chicago, Indianapols & Louisville, the Illinois Central, the Wabash and the Indiana Harbor.

The roads in these two different groups not only have yards situated near yards of the companies in the roads of the other group, but in many cases are sending their men every day with switching trains long distances over the lines of other companies.

Mr. Gray filed a dissenting opinion. The award will affect eight thousand men, and will cost the roads $1,250,000. Mr. Gray held that the roads were unable to bear the expense, and that the Pere Marquette, the Chicago Great Western, and the Chicago Terminal would be irreparably injured. He also held that the increased efficiency of the service is due more to the management than to the men themselves.

Railway Matters in Washington.

Washington, March 23, 1910.

The House committee, after numerous long discussions and the proposal of many amendments, is now understood to have agreed on a re-draft of the President's railway bill, and it is expected to be presented to the House within a day or two. It is understood that a number of the provisions of Mr. Mann's bill have been inserted in the administration bill. Among the proposals said to be favored by this committee is one to give the Interstate Commerce Commission almost absolute power to enforce the long and short haul clause of the law, without being restricted by the provision regarding similarity of circumstances and conditions.

Senator Cummins talked four days in the Senate on the administration bill; Senator Elkins took another day to reply to him, and Senator Clapp has also spoken in opposition to the bill. The discussion which these speeches have aroused has, however, been of a perfunctory character. Neither the defenders of the President's proposal nor those who are supposed to be unfriendly have organized their forces; and as yet it is difficult to see what forces they have. In other words, there is little evidence of crystallized opinion in either the Senate or the House on any of the provisions of the bills.

The Senate Committee on Interoceanic Canals is understood to be unfavorable to the Flint bill, to provide for a line of government steamers between the northern Pacific coast and Panama, to break the monopoly of the Pacific Mail Steamship Co. The bill provides for heavy expenditures in the purchase of steamers. It is possible, however, that the committee may favor the hiring of steamers, which would permit the government to make the experiment of competing with the Pacific Mail.

The federal corporation tax law was argued before the Supreme Court last Thursday by Ex-Senator Foraker. He made a strong presentation of the objections to the constitutionality of the act. There are 15 cases before the court involving the validity of this tax. The Coney Island & Brooklyn Railroad Co. has presented arguments *in favor of* the law. An amendment has been incorporated in the legislative appropriation bill providing that only the President shall have the power to disclose information of corporations making returns under this law.

The records of the post office department show that in the last fiscal year the aggregate amount of fines assessed against the railways for failures to run mail trains on time amounted to $34,000, as compared with $675,000 in the year preceding. The appropriation bill for 1909 was silent on the subject of fines, leaving the matter to be managed by the department at its own discretion. Fines are to be imposed only where the delay could have been avoided "by ordinary diligence," but for several years past, and until 1909, Congress inserted a provision in the appropriation bill requiring a rigid enforcement of this provision of the law, and exorbitant fines were imposed.

Canadian Society of Civil Engineers.

At the meeting of the electrical section, held at Montreal, Canada, on March 24, a paper, Resonance in Alternating Current Circuits, was given by J. Dalemont.

American Institute of Electrical Engineers.

The regular April meeting will be held in the auditorium of the Engineers' building, New York, on April 15, 1910. The meeting is to be held under the auspices of the educational committee of the institute. Dr. Samuel Sheldon, professor of physics and electrical engineering of the Brooklyn Polytech-

nic Institute, Brooklyn, N. Y., will present a paper, Education for Leadership in Electrical Engineering.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; May 10-13; Indianapolis.
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.; June, 1910; Niagara Falls, Ont.
AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—C. M. Burt, Boston, Mass.; Havana, Cuba; March 28.
AMERICAN ASSOC. OF LOCAL FREIGHT AGENTS' ASS'NS.—G. W. Dennison, Penna. Co., Toledo, Ohio.
AMERICAN ASS'N OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew Bldg., Cincinnati, Ohio.
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., N. Y.; 2d Friday in month; New York; March 30-April 1; Charlotte, N. C.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York; May 18; New York.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.
AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago.
AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis; second Tuesday, May; Memphis, Tenn.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Building, Chicago; June 20-22; Atlantic City.
AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.; July 12; Chicago.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N. Y.; 2d Tues. in month; New York; May 31-June 3; Atlantic City.
AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York.
ASSOCIATION OF AM. RY. ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; June 29, 1910; Colorado Springs.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A., T. & S. F., Topeka, Kan.; May 25-27; Chattanooga, Tenn.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago; May 16-20, 1910; Los Angeles.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Place, N. Y.
BUFFALO TRANSPORTATION CLUB.—J. N. Sells, Buffalo.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, Montreal, Que.; irregular, usually weekly; Montreal.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton Bldg., Pittsburgh
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.; June 15, 1910; California.
INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., N. Y.; May 24-27; Niagara Falls, Ont.
INTERNATIONAL RAILWAY MASTER BLACKSMITHS' ASS'N.—A. L. Woodworth, Lima, Ohio; Aug. 16-18; Detroit, Mich.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago; May 23-26; Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.; May; Cincinnati.
INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11, Brussels; July 4-16; Berne, Switzerland.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 15-17; Atlantic City.
NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION.—March 24-25; Rochester, N. Y.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass., 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
NORTH-WEST RAILWAY CLUB.—T. W. Flanagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.
NORTHERN RAILWAY CLUB.—Fourth Saturday in month; Duluth, Minn.
OMAHA RAILWAY CLUB.—A. H. Christiansen, Barker Blk.; 2d Wednesday in month.
RAILROAD CLUB OF KANSAS CITY.—Third Friday in month; Kansas City.
RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C., Collinwood, Ohio; May 16-18; St. Louis.
RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASS'N.—H. M. Buck, Secy.-Treas., 30 Church street, New York.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E Emery, P. & P. U. Ry., Peoria, Ill.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Norquist, Chicago.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.
SOUTHERN & SOUTHWESTERN R.R. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., Mar., July, Sept. and Nov.; Atlanta.
TRAFFIC CLUB OF NEW YORK.—C. A. Swope.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg; 2d Monday, except June, July and August; Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago, 1st Wednesday, except July and August; Chicago.

Traffic News.

According to Ohio papers the New York Central has within the past week found itself short several hundred cars; and on one day the requests of shippers amounted, it is said, to 5,000 more than the company could furnish.

It is reported in Boston that the Boston & Albany has agreed to make a reduction this year in the rate on export grain from Lake Erie to Boston, with a view to meeting the sharp competition of the lines which carry grain for export to Montreal.

The Buffalo, Rochester & Pittsburgh is going to run a farmers' special train carrying experts from the Pennsylvania School of Agriculture. According to the *Pittsburgh Times*, which reports this statement, all up-to-date railways will soon be running farmers' specials.

The Canadian Northern Railway is to run steamships this summer between Montreal, Canada, and Bristol, England. The "Royal Edward" will leave Bristol for Montreal May 12, and returning will leave Montreal May 26. The "Royal George" will leave Bristol May 26 and return June 9, and thereafter steamships will sail once a fortnight. H. C. Bourlier, of Toronto, formerly with the Allan Line, has been appointed general agent of the new "Royal Line."

According to a press despatch from Omaha, the Chicago, Rock Island & Pacific is now getting all of the packing house products that are shipped east from that city because it can make lower rates than any other road. Notice was given in February, by all of the lines, that rates on packing house products to eastern cities would be increased March 21, and the tariffs went into effect on that day; but from Albright, a station on the Rock Island just outside of the South Omaha yard limits, the old and lower rates still prevail, the company having filed no new tariff for that station.

Total rail shipments of freight from New York to the West—Buffalo, Pittsburgh, etc., and beyond—in January were 143,821 tons; in January of last year 115,566 tons; increase 24.45 per cent. In December the total quantity was about the same, and the increase over December, 1908, was 15.5 per cent. The percentages carried by each of the nine initial lines in January were as follows:

January.	1910, tons.	Per cent.	1909, tons.	Per cent.
New York Central	28,300	19.7	19,241	16.6
Pennsylvania	30,912	21.5	23,200	20.1
Erie	16,614	11.6	13,326	11.5
Baltimore & Ohio	11,618	8.1	9,786	8.5
West Shore	7,513	5.2	6,676	5.8
Del., Lack. & Western	17,818	12.4	14,983	13.0
Lehigh Valley	16,890	11.7	14,378	12.4
New York, Ont. & Western	10,232	7.1	10,867	9.4
Central R. R. of New Jersey	3,924	2.7	3,109	2.7
Total	143,821	100.0	115,566	100.0

For the last calendar year the Pennsylvania carried 18.9 per cent. and the New York Central 17.9.

In the year 1909 south Jersey farmers shipped more than $7,500,000 worth of produce, an increase of 34 per cent. over 1908. The freight filled 18,891 cars, and a good part of it went out of the state. The market has been greatly widened by the campaign of the Pennsylvania Railroad in behalf of the agricultural interests of that region. The south Jersey farmer is now in as close touch with his markets as any business man, and is careful to see that his products are forwarded to destinations where he will receive the maximum price. The construction by the Pennsylvania Railroad of the bridge across the Delaware river has resulted in improved through train service. Over 7,200 cars went to Camden and Philadelphia and 4,985 to Jersey City and New York; Newark, N. J., 1,186 cars; other New Jersey points, 399; Buffalo, 331; Rochester, 145; Pittsburgh, 792; Boston, 829; Chicago, 342, and so on; and some went to Michigan, 76; Nebraska, 4; North Dakota, 3; South Dakota, 1; Indiana, 10; Iowa, 6; Richmond, Va., 1; Louisville, Ky., 3; Kansas, Vermont, Maine, Michigan, Colorado, Oklahoma and other states, and to Canada. The principal commodities were: Berries (660 cars), cranberries; fish (573 cars), melons; mixed carloads (3,163 cars), oysters and clams (3,401 cars), peppers (418 cars), poultry (496 cars), potatoes (8,002 cars), and tomatoes (1,478 cars).

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY, 1910.
(See also issues of March 11 and 18.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance Way and structures.	Maintenance Of equipment.	Traffic.	Transportation.	General.	Total.					
Ann Arbor	301	$124,024	$29,795	$163,490	$12,209	$21,405	$3,862	$64,450	$4,668	$106,594	$56,896	—$17,432	$12,331	$27,133	$13,192
Buffalo & Susquehanna	361	135,275	13,930	156,350	28,155	66,110	2,564	78,036	7,857	182,722	—26,372	—10	4,000	—30,382	—41,464
Central R.R. of New Jersey	668	1,438,802	308,724	1,857,684	139,896	305,075	26,189	568,755	37,139	1,077,054	780,630	—6,252	95,573	678,805	86,098
Central Vermont	411	182,788	60,980	265,948	21,526	44,852	12,211	132,908	8,228	219,725	46,223	428	10,116	36,534	19,245
Charleston & Western Carolina	340	93,481	24,335	124,068	30,390	17,631	3,032	40,446	3,334	94,833	29,235	.....	4,475	24,760	13,333
Chicago & Alton	998	593,805	305,460	987,906	99,618	162,458	43,656	447,863	35,079	788,674	199,232	—2,064	32,000	165,168	—121,928
Chicago & Erie	269	338,915	49,383	427,619	33,485	102,852	15,742	205,008	8,774	365,861	61,758	.....	10,938	50,820	37,574
Chicago, Cincinnati & Louivsille	284	89,357	17,021	113,793	16,623	25,450	8,636	67,758	6,189	124,656	—10,863	.....	3,410	—14,273	—7,405
Chicago, Peoria & St. Louis	255	141,966	18,041	166,274	22,619	31,814	6,655	72,039	5,258	138,385	27,889	.....	4,500	23,389	20,033
Cincinnati, New Orleans & Texas Pac	337	564,999	138,955	742,453	82,472	141,327	19,728	201,200	19,550	464,277	278,176	—722	20,000	257,454	48,022
Colorado Midland	337	118,991	25,866	157,460	16,737	34,067	10,314	84,950	6,271	152,339	5,121	—641	10,734	—6,255	—51,400
Detroit, Toledo & Ironton	441	87,939	10,561	108,423	34,765	32,093	2,651	65,951	4,552	140,012	—31,589	443	6,510	—37,656	—21,259
Duluth, South Shore & Atlantic	599	135,463	60,445	211,326	29,816	27,492	9,231	93,094	6,145	165,778	45,548	—929	18,000	26,619	8,728
Elgin, Joliet & Eastern	781*	622,906	6	691,029	95,466	152,227	4,291	276,566	13,042	541,592	149,437	.....	13,500	135,937	20,822
Fort Worth & Denver City	454	275,823	127,160	423,023	42,485	59,226	6,289	144,143	15,214	267,357	155,666	—5,803	9,938	139,925	42,181
Georgia	307	171,228	67,898	255,348	25,320	36,698	10,985	101,781	7,194	181,978	73,370	.....	1,833	71,537	10,774
Grand Trunk Western	336	324,037	147,632	496,325	32,473	73,983	18,814	211,964	14,791	352,025	144,300	—1,930	29,190	113,180	22,968
Gulf & Ship Island	307	132,213	31,196	174,273	32,711	31,294	1,504	53,907	7,644	127,060	47,213	.....	4,863	42,350	4,934
Hocking Valley	350	485,173	60,411	567,654	60,299	100,428	7,719	192,233	14,168	374,847	192,807	—997	20,676	171,134	109,730
Houston & Texas Central	789	278,400	103,988	417,715	67,347	72,942	18,431	195,585	20,698	375,004	42,711	.....	16,485	26,226	—23,868
Iowa Central	558	202,571	38,616	253,347	25,321	48,251	7,282	130,218	9,986	221,058	32,289	.....	7,497	24,792	278
Midland Valley	324	81,793	27,057	113,791	19,048	22,846	1,806	38,485	5,906	88,091	25,700	310	8,000	18,010	14,854
Minneapolis & St. Louis	1,027	226,929	69,365	322,652	32,248	53,593	10,650	170,407	13,942	280,840	41,812	108	16,924	24,996	—29,069
Morgan's La. & Tex. R.R. & S. S. Co.	358	310,071	100,108	439,375	57,867	50,037	10,975	142,190	12,413	273,482	165,893	4,619	17,000	153,512	82,342
New Orleans, Mobile & Chicago	403	115,147	28,227	154,188	22,478	15,087	2,171	46,412	9,450	95,598	58,590	.....	3,544	55,046	2,300
Northwestern Pacific	376	67,052	92,264	179,183	41,990	32,358	2,599	83,316	9,640	169,903	9,280	.....	10,988	—1,708	12,143
Oregon R.R. & Navigation Co.	1,476†	639,906	263,603	983,104	127,081	127,219	29,885	424,061	31,583	739,829	243,275	—5,952	42,190	195,133	9,384
St. Joseph & Grand Island	319	87,617	28,214	124,624	23,163	18,214	6,138	61,799	6,045	115,359	9,265	—111	5,389	3,765	—21,078
St. Louis, Brownsville & Mexico	455	86,767	46,267	141,860	38,916	8,997	2,444	48,909	6,422	105,688	36,172	.....	3,500	32,672	11,883
Santa Fe, Prescott & Phoenix	257	82,848	27,118	115,713	16,334	8,939	2,334	30,099	5,121	62,827	52,886	.....	76	52,810	9,267
Spokane, Portland & Seattle	420§	141,064	55,722	208,278	57,199	46,877	2,508	101,471	7,322	215,377	—7,099	10,422	19,200	—15,877	—4,136
Toledo & Ohio Central	440	298,162	42,043	357,047	36,156	55,451	4,957	120,800	7,912	225,276	131,771	2,522	14,654	119,639	67,774
Toledo, Peoria & Western	248	73,405	29,495	107,615	12,987	17,376	2,556	42,454	3,181	78,554	29,061	.....	6,000	23,061	18,378
Toledo, St. Louis & Western	450	242,588	32,312	293,668	35,004	51,233	9,184	112,863	9,329	217,613	76,055	.....	12,000	64,055	13,587
Trinity & Brazos Valley	455‡	159,814	20,545	185,713	47,643	29,632	6,145	93,138	14,038	190,596	—4,883	.....	3,500	—8,383	—3,897
Virginian	444‡	143,634	15,864	166,047	22,302	29,203	5,823	55,784	7,392	120,504	45,543	231	13,000	32,774	.....
SEVEN MONTHS OF FISCAL YEAR, 1910.															
Ann Arbor	301	$703,509	$300,563	$1,092,906	$154,763	$131,200	$29,222	$373,907	$30,057	$719,149	$373,757	—$7,205	$86,314	$280,237	$45,678
Buffalo & Susquehanna	361	1,223,142	142,312	1,414,773	244,005	388,843	15,194	539,682	55,144	1,242,868	171,905	—171	28,000	143,734	—81,486
Central R.R. of New Jersey	668	10,272,521	2,709,813	13,723,247	1,200,297	2,195,728	205,630	3,703,508	284,297	7,589,460	6,133,787	189,828	686,520	5,637,095	722,094
Central Vermont	411	1,422,735	668,216	2,244,513	259,085	418,440	62,175	895,199	51,522	1,686,421	558,092	6,111	70,816	493,387	187,515
Charleston & Western Carolina	340	667,517	198,609	914,884	209,262	115,875	21,317	300,400	24,595	671,449	243,435	.....	31,325	212,110	49,994
Chicago & Alton	998	4,999,186	2,560,480	8,187,860	1,014,389	920,473	280,027	2,706,454	210,349	5,131,692	3,056,168	—10,021	224,000	2,822,147	—189,153
Chicago & Erie	269	2,238,723	489,041	2,975,582	353,493	629,823	108,531	1,241,716	63,290	2,396,853	578,729	.....	76,570	502,159	228,433
Chicago, Cincinnati & Louivsille	284	688,232	191,585	931,012	166,357	155,281	60,726	416,992	41,873	841,229	89,783	.....	23,840	65,943	100,408
Chicago, Peoria & St. Louis	255	849,115	194,662	1,089,747	155,221	214,562	45,578	408,530	36,109	860,000	229,747	.....	29,400	200,347	89,933
Cincinnati, New Orleans & Texas Pac	337	4,003,756	926,012	5,185,045	586,063	993,526	135,317	1,411,831	124,926	3,251,663	1,933,382	—638	140,000	1,792,744	422,049
Colorado Midland	337	1,041,534	249,785	1,465,038	181,933	231,492	72,292	621,355	39,441	1,146,513	318,525	—2,231	66,835	249,459	—75,674
Detroit, Toledo & Ironton	441	770,500	100,041	940,302	204,322	174,579	20,737	438,258	28,801	866,697	73,605	316	45,572	28,349	—54,324
Duluth, South Shore & Atlantic	599	1,222,615	604,910	1,931,069	294,953	206,622	65,012	700,417	47,957	1,314,961	616,108	7,090	134,146	489,052	166,823
Elgin, Joliet & Eastern	781*	4,955,162	143	5,371,541	517,743	1,023,714	29,080	1,585,385	113,406	3,269,328	2,102,213	.....	94,500	2,007,713	779,520
Fort Worth & Denver City	454	2,009,011	1,087,047	3,232,528	335,383	402,612	47,004	942,044	101,075	1,828,118	1,404,410	—1,794	56,458	1,346,158	310,729
Georgia	307	1,226,734	505,671	1,836,146	229,101	274,423	68,448	688,387	49,659	1,310,018	526,128	.....	14,561	511,567	190,504
Grand Trunk Western	336	2,226,976	1,148,182	3,597,199	401,111	509,921	149,655	1,307,756	90,791	2,459,234	1,137,965	—5,792	204,330	927,843	51,332
Gulf & Ship Island	307	922,530	258,857	1,260,987	236,658	209,504	9,159	368,353	51,487	875,161	385,826	.....	34,050	351,776	106,350
Hocking Valley	350	3,778,234	548,013	4,471,879	589,631	796,425	52,633	1,222,218	84,189	2,745,096	1,726,783	85,606	149,719	1,662,670	459,410
Houston & Texas Central	789	2,524,096	893,197	3,651,228	446,662	402,077	123,050	1,328,635	137,262	2,437,686	1,213,542	.....	100,183	1,113,359	10,015
Iowa Central	558	1,573,751	336,618	1,996,824	264,017	302,948	60,238	814,739	62,041	1,503,983	492,841	.....	51,934	440,907	101,680
Midland Valley	324	564,721	197,523	800,770	129,922	156,052	13,400	222,191	33,357	554,922	245,848	165	56,000	190,013	158,547
Minneapolis & St. Louis	1,027	2,027,312	767,941	2,988,605	310,996	339,100	88,541	1,126,846	93,642	1,959,125	1,029,480	—336	135,508	893,636	48,665
Morgan's La. & Tex. R.R. & S. S. Co.	358	2,189,985	674,449	3,025,146	375,530	339,136	71,939	1,006,709	88,854	1,882,169	1,142,977	—64	123,520	1,019,393	246,441
New Orleans, Mobile & Chicago	403	718,460	200,718	985,993	151,458	94,486	15,124	300,411	59,372	620,851	365,142	.....	25,593	339,549	44,986
Northwestern Pacific	376	793,958	980,676	1,923,642	334,289	227,841	18,523	655,417	67,480	1,303,550	620,092	.....	74,881	545,211	120,411
Oregon R.R. & Navigation Co.	1,476†	5,753,175	2,694,748	8,966,032	929,785	760,024	213,489	2,751,875	230,463	4,885,636	4,080,396	4,678	396,134	3,688,940	—76,169
St. Joseph & Grand Island	319	663,526	250,969	989,217	223,102	111,243	44,455	383,296	33,616	795,712	193,505	—184	39,197	154,124	—172,960
St. Louis, Brownsville & Mexico	455	530,817	266,166	848,482	226,938	72,377	17,777	289,963	45,388	652,443	196,039	.....	22,500	173,539	45,974
Santa Fe, Prescott & Phoenix	257	582,207	200,344	832,373	130,073	63,259	19,011	211,542	36,198	460,084	372,289	.....	260	372,029	28,092
Spokane, Portland & Seattle	420§	1,365,282	464,026	1,902,926	334,504	194,475	21,353	652,253	44,859	1,247,444	655,482	1,239	193,710	463,011	381,212
Toledo & Ohio Central	440	2,088,717	388,262	2,584,622	344,394	408,684	39,687	791,779	46,271	1,630,815	953,807	60,019	99,332	914,494	—23,584
Toledo, Peoria & Western	248	420,458	248,234	704,675	119,016	116,274	15,820	248,636	22,232	521,978	182,697	.....	31,000	151,697	32,322
Toledo, St. Louis & Western	450	1,850,105	283,354	2,269,538	262,516	330,260	48,136	715,083	60,884	1,416,879	852,659	.....	84,000	768,659	94,509
Trinity & Brazos Valley	455‡	1,170,380	136,018	1,333,134	245,260	227,157	37,724	596,880	78,729	1,185,749	147,385	.....	25,353	122,032	—30,019
Virginian	444‡	902,494	126,213	1,079,238	178,929	194,690	41,332	319,942	51,378	786,271	292,967	3,154	79,667	216,454	.....

* Mileage operated January 31, 1909, 742. † Mileage operated January 31, 1909, 1,327. ‡ Mileage operated January 31, 1909, 434. § Mileage operated January 31, 1909, 272. ‡ Began regular operations on July 1, 1909. — Indicates Deficits, Losses and Decreases.

President Taft at Chicago Traffic Club.

President Taft was the guest of the Traffic Club of Chicago at noon on March 17, and while there was elected an honorary member of the club and made a speech. His talk was devoted mainly to a statement of his attitude toward railway men. The president said:

"It seems to be in the mind of some men in positions of responsibility that those who are affected directly never should be consulted. If, in the recommendation of legislation affecting railways, you consult the railway men, who are affected, these people will consider that sufficient to condemn you and all the legislation you recommend.

"But I consider that I would be a coward if I did not consult every interest affected by the legislation I have to pass upon. I am against the railways only when they violate the law, and I consider that every man is entitled to his day in court. I may be criticized, but I am not afraid of the people of the United States. They are fair. The great difficulty, however, is to get to them with the facts.

"Now, I did not intend to say this exactly, but I have said it and I mean it.

"The time was in this country when it was most difficult for any railway man to conduct his business within the law. I would bring it about so that he may conduct his business within the law and so that the law shall be fair, and so that he shall be made to feel the penalty of the law when he steps outside of it.

"I believe there is a course, and legislation, that can bring this about, and I hope that I always may be able, no matter what the result may be, to do justice between the great interests of this country—the people, the shippers and the railways; and I hope that every man shall see that it is to his ultimate advantage to uphold the law and preserve it and make it inviolate."

Brief as the speech was it probably has caused as much comment among railway men and shippers in Chicago as anything Mr. Taft ever said. Many of them have given interviews to the press heartily endorsing the attitude taken.

Agronomy and Other Things.

The latest farmers' special takes in everything, almost. It is that of the Oregon Railroad & Navigation Company, and is to be run in eastern Oregon from March 31 to April 10. The lecturers are from the Oregon Agricultural College, 12 members of its faculty. It is planned to make up the train as follows: One car for a live stock exhibit; one flat car for farming machinery; one flat car for a poultry yard exhibit; one baggage car for poultry supplies and demonstrations; one baggage car for a horticultural exhibit; one baggage car for agronomy; one baggage car for dairying machinery and supplies; one Pullman sleeper and one business car.

INTERSTATE COMMERCE COMMISSION.

Interpretation of Utah Demurrage Provisions.

United States v. Denver & Rio Grande. Opinion by Chairman Knapp.

The reclamation service of the government, in connection with an irrigation project at Strawberry Valley, aided the defendant in building a 700-ft. side track at mile post 679, about two and a half miles west of Thistle Junction. The track, although principally for use by the government, was also used for other purposes, and was therefore a public and not a private siding. The government ordered 52 cars of cement to be shipped from Independence, Kan., billed "to mile post 679, near Thistle Junction." The government then ordered a certain number of cars—the exact number being in dispute—placed on its track each day. The railway company followed these instructions, holding cars at Thistle Junction until the government was ready to have them placed on the side track. The Utah Car Service Association rules in regard to demurrage provide that as prevent prompt delivery, then such cars will be considered as having been placed when the road offering the cars would have delivered them had the condition of such tracks permitted.

Section 1.—Cars containing freight to be delivered on carload delivery tracks or private sidings shall be placed on the tracks designated immediately upon arrival, or as soon thereafter as the ordinary routine of yard work *will permit*. Delivery will not be made on specially designated yard or tracks except when it is *practicable* to do so. When such delivery cannot be made, on account of such tracks being fully occupied, *or for any other reasons beyond the control of the carrier*, delivery shall be made at the nearest available point.

Sec. 2.—Delivery of cars shall be considered to have been effected at the time when such cars have been placed on the proper private or public delivery tracks, or if such track or tracks already contain such number of cars belonging to the same consignee. The commission holds that since the track in question could have accommodated nine cars, and was never at any time filled to its capacity, the railway company cannot charge demurrage on the cars held at Thistle Junction.

Commissioner Prouty dissenting:

It is conceded that if the non-delivery of the balance of the cars at Thistle Junction was due to a reason beyond the control of the carrier, the demurrage charge properly could be made. The railway company simply followed orders in delivering only two cars a day to the side track, and therefore it was induced to this course by a reason beyond its control. It is a novel proposition that the United States can defeat the right of the defendant to the demurrage which properly accrued for the detention of these cars at Thistle Junction by showing that the defendant obeyed its instructions. (18 I. C. C., 7.)

Demurrage Charges on Coal Cars Held Reasonable.

Peale, Peacock & Kerr et al. v. Central of New Jersey. Georges Creek Coal & Iron Co. v. same. Opinion by Commissioner Clark.

Complainants allege that the defendant's demurrage regulations on coal and coke held for trans-shipment at tidewater ports are unjust, unreasonable and discriminatory; first, in favor of shippers of large tonnage; second, in favor of lake ports, southern ports and New York harbor points, where no demurrage is charged or where more liberal rules apply; third, in favor of competitors in bituminous coal markets operated under embargo, under demurrage regulations which are not enforced, or where no demurrage regulations obtain. The commission is asked to enter an order enjoining defendant from collecting demurrage charges that have accrued under existing rules, and to enter an order that demurrage should be computed on the average over a year instead of on the average monthly.

It is held that no power rests in this commission to enjoin a carrier from collecting its lawful tariff charges for services rendered; that it would be unreasonable to extend to one year the period on which average demurrage will be computed; that free time should be computed from 7 a.m. of the day succeeding the date on which car arrives at the yards to and including the date on which car is unloaded or upon which vessel registers at the pier as ready to receive that consignee's shipments, provided that consignee has sufficient coal in the yard to load his vessel and has ordered same dumped. Defendant's rules do not unjustly discriminate against complainants or unduly prefer other shippers or places. (18 I. C. C., 25.)

Uniformity in Minimum Carload Weights Prescribed.

Acme Cement Plaster Co. v. Chicago Great Western et al. Opinion by Commissioner Prouty.

A common carrier cannot impose an unreasonable rate because of the origin of the traffic. The minimum carload weight upon cement plaster as applied to the rates above established ought not to exceed 30,000 lbs. To whatever points a minimum carload weight of 60,000 lbs. on cement plaster is accorded from Gypsum, Iowa, the same minimum weight, with a corresponding reduction in the rate, should be given from Council Bluffs, Iowa.

It seems that in the making of rates from Rapid City, S. Dak., to Missouri river points on cement plaster, where competition from both Gypsum and Laramie, Wyo., must be met,

certain intermediate points in this territory are given a lower rate than would otherwise be accorded and a rate somewhat lower in proportion to distance than is made from Gypsum or Council Bluffs; held, that the apparent discrimination is, under all the circumstances, not undue. (18 I. C. C., 19.)

Discrimination Against Henderson, Ky.

Henderson Elevator Co. v. Illinois Central. Opinion by Chairman Knapp.

During a part of 1906 defendant, by provisions in its tariffs, applied to the transportation from Omaha, Neb., and Council Bluffs, Iowa, to Cairo and other Ohio river crossings of grain placed in elevators at the latter points and reshipped thence to southeastern destinations proportional rates less than the local rates paid from said points of origin to said destinations, but no such transit privilege was allowed at Henderson, Ky.; held, that failure to allow the proportional rate and transit privilege at Henderson unlawfully discriminated against complainants' business at that point. Reparation awarded. (17 I. C. C., 573.)

Competition of Express Companies with U. S. M.

Nathan B. Williams v. Wells Fargo & Co. Opinion by Commissioner Prouty.

The defendant express company does not, in handling small packages in competition with the United States government in the transportation of mail matter, or in filing its tariffs applicable thereto, transgress any provision of the act to regulate commerce. (18 I. C. C., 17.)

COURT NEWS.

Judge Kohlsaat of the federal court at Chicago on March 15 refused to grant a permanent injunction restraining the railways entering Chicago from putting into effect the National Car Demurrage rules. A short time ago Judge Kohlsaat issued an order temporarily restraining the roads from putting the rules into effect. He rescinds this order but keeps jurisdiction of the case in order to enforce any order that may be issued by the Interstate Commerce Commission with regard to the matter. The Chicago grain interests will appeal to the commission.

STATE COMMISSIONS.

The Illinois Railway Commission has issued an order requiring the general superintendents or general managers of railways within the state to make reports to it of accidents immediately after their occurrence. The commission complains that heretofore reports have often been made by claim agents and other persons without knowledge of the facts instead of by the responsible operating officers.

The Oklahoma Corporation Commission a few weeks ago summoned the executive officers of 16 railways to appear before it on March 15 and supply it with information which would enable it to ascertain the cost of operating these roads in Oklahoma. When the commission met on March 15 only one of the roads was represented, this being the St. Louis, Iron Mountain & Southern. The commission then extended its order to April 18.

New York: Increase in Milk Rates Disapproved.

Holding that milk is a necessity of life, the New York Public Service Commission, Second district, has decided that the advance of ½ cent per gallon in the rates on milk to Buffalo for distances up to 75 miles, and of 1 cent per gallon in rates on cream for the same distances, made by the roads entering that city, is unreasonable and unjust and that the rate should not exceed 1½ cents per gallon in 8 and 10-gal. cans on milk and 2½ cents per gallon on cream in 5 and 10-gal. cans.

The commission wholly sustains the complaints made by the Western New York Milk Producers' Association and the Association of Milk Dealers of Buffalo against the six roads entering the city from the south and east. The opinion was by Commissioner Decker and lays down the following principles:

1. The commission has jurisdiction to entertain a complaint filed against published advances in rates before such rates become effective.
2. When rates long in effect are challenged the burden of proof is upon the complainant, and when advances in rates are complained of the burden of proof is upon the respondent.
3. Milk is a food article of daily consumption, properly regarded as a necessity of life in all households, and as such must be deemed to come within that class of commodities which the whole public interest requires shall be transported by public carriers to consuming localities at low rates.
4. This commission has absolutely no function to perform respecting the regulation of prices for milk made by dealers and charged to consumers. Its duties are confined to the fixing of transportation charges on milk when shown unreasonable or unjust upon complaint presented, and the same provisions of law which require carrier's charges shall be limited to the point of reasonableness justify the carrier in insisting upon the right to charge as much as is actually reasonable.
5. In a case involving the reasonableness of rates the cost of production of a given article, the cost of handling that article for sale, and the prices charged in wholesale and retail markets or for delivery to consumers are all elements entitled to full weight, but with them are to be considered the history of the traffic in question and the conditions pertaining to performance of transportation by the carrier, including the changes in such conditions.
6. Evidence showing the general custom of carriers as to rates on a given article to a large number of cities and throughout wide territories is not conclusive—similarity of traffic and transportation conditions must also be established, and this must then be considered in connection with the other elements of the case.
7. The increased cost of labor, materials and equipment for railways may be fully met by increased volume of traffic on the railway, and the question whether an increased railway rate is justified is by no means settled when it is shown that as compared with former years the railway company is subjected to greater present cost of operation.
8. There is no evidence upon which the commission can ascertain the cost of the milk service on the respondent lines. While there has been a general increased cost of railway operation and some increase in the average distance haul of milk by respondents to Buffalo, the practically constant use of the same car equipment in milk traffic, the economical employment of passenger trains and passenger train crews in that service, the large and constantly increasing volume of the milk traffic and its reliable character as a daily movement, and all of the other stated conditions in these cases indicate that the old rate on milk was profitable to the respondents and would be so under present conditions.

The order of the commission as to the Buffalo & Susquehanna Railway is, on account of the present financial condition of that company, suspended pending further investigation.

Wisconsin: Telephone Installation Ordered.

Burlington, Brighton & Wheatland Telephone Co. v. Chicago & North Western.

Petition praying for an order compelling the respondent to install one of petitioner's telephones in its stations at Fox River. One subscriber of petitioner resides in said station and all of its subscribers, 258 in number, reside on farms and in villages adjacent to such station and transact business at same to a considerable extent. Within the meaning of ch. 614, Laws of 1907, every railway station is an "office" and in relation to the question of reasonably adequate telephone service it is immaterial whether such station is a station within the meaning of Sec. 1801, R. S.; that said chapter requires reasonably adequate telephone service at its stations where it can be had; that in the instant case such service can be had and respondent is ordered to install a telephone in its station at Fox River.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Joseph Ramsey, Jr., vice-president of the Ann Arbor, with office at New York, has been elected president, succeeding E. Zimmerman.

Kingdon Gould has been elected vice-president of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, with office at New York.

William S. Kenyon, general attorney of the Illinois Central, with office at Chicago, has resigned to accept the appointment as assistant to the Attorney-General of the United States, succeeding Wade H. Ellis.

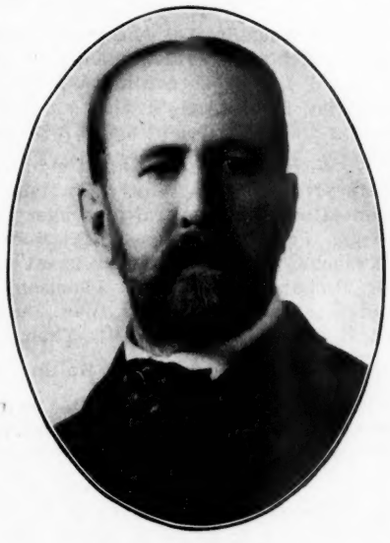
W. C. Brown, president of the New York Central Lines, has been elected also president of the Toledo & Ohio Central, succeeding C. T. Lewis, and the other executive officers of the New York Central Lines have also been elected to take positions on the Toledo & Ohio Central.

Charles S. Clarke, vice-president of the Missouri Pacific, has been elected first vice-president, with office at St. Louis, Mo. C. H. Middleton and M. C. Markham, assistants to the vice-president at St. Louis, have both been elected assistants to the first vice-president, with office at St. Louis.

W. M. White, vice-president and general manager of the Liberty White Railroad at McComb City, Miss., has been elected president and general manager, with office at McComb City, succeeding J. J. White, resigned. J. W. Johnson has been elected vice-president, with office at McComb City.

C. E. Walker, secretary, treasurer and purchasing agent of the Southern Pacific's subsidiary lines, having resigned to engage in other business, the following appointments have been made: Gibson Taylor has been appointed assistant secretary of the Southern Pacific Railroad of Mexico, also secretary of the Arizona Eastern, the Phoenix & Eastern, the Gila River Railroad and the Aravaipa Canyon Railroad. P. J. Archer has been appointed treasurer and purchasing agent of the Arizona Eastern, assistant treasurer and purchasing agent of the Southern Pacific Railroad of Mexico, treasurer of the Phoenix & Eastern, the Gila River Railroad and the Aravaipa Canyon Railroad, also purchasing agent and cashier of the Sonora Railway, both with offices at Tucson, Ariz.

E. O. McCormick, whose election as vice-president of the Southern Pacific Company, with office at San Francisco, Cal., has been announced in these columns, was born April 3, 1858, at Lafayette, Ind. He received a high school education and began railway work in 1879 in the construction department of the Lake Erie & Western. He was then consecutively in the freight department of the Louisville, New Albany & Chicago, now a part of the Chicago, Indianapolis & Louisville, at Lafayette; general agent for the Great Eastern Freight Line at Louisville, Ky.; city passenger and ticket agent at Louisville and later at Chicago, then general northwestern passenger agent and later general passenger and ticket agent at Chicago for the Chicago, Indianapolis & Louisville; general passenger and ticket agent of the Cincinnati, Hamilton & Dayton, and traffic manager of the Cleveland, Cincinnati, Chicago & St. Louis. In May, 1899, he was made passenger traffic manager of the Southern Pacific at San Francisco, Cal., and five years later he was appointed assistant traffic director of the Southern Pacific and the Union Pacific, with office at Chicago, from which position he has recently been promoted.



E. O. McCormick.

William S. Kies, whose appointment as general solicitor of the Chicago & Western Indiana and the Belt Railway Company of Chicago, with office at Chicago, has been announced in these columns, was born December 2, 1877, at Mapleton, Minn. He received the degree of B.L. from the University of Wisconsin in 1899 and a second degree from the same institution in 1900. After graduation he became an investigator for the Chicago City Railway and was later chief trial attorney for the city of Chicago. Five years ago he was appointed general attorney for the Chicago & North Western, which position he held at the time of his recent appointment as general solicitor.

Photograph by Matzene.

William S. Kies.

The following have been elected officers of the Temple Northwestern, a line under construction in Texas: W. J. McDaniel, president; H. W. Peck, first vice-president and general attorney; J. B. Grigsby, second vice-president, all of Dallas, Tex., and P. L. Downs, of Temple, Tex., treasurer. T. C. Taylor, soliciting freight agent of the Atchison, Topeka & Santa Fe at Dallas, Tex., has been appointed secretary and auditor of the Temple Northwestern, with office at Temple. See item under Traffic Officers.

Operating Officers.

The office of J. B. Sucese, superintendent of the Chicago, Indianapolis & Louisville, will be changed from Chicago to Indianapolis, Ind.

J. V. Kennedy, trainmaster of the Cleveland, Cincinnati, Chicago & St. Louis at Riverside, Ohio, has been appointed superintendent of terminals at Cincinnati, Ohio.

J. M. Scott, superintendent of the Cincinnati, Hamilton & Dayton at Indianapolis, Ind., has been appointed superintendent at Dayton, Ohio, succeeding T. A. Sweeney, resigned to accept service elsewhere. R. B. White succeeds Mr. Scott.

T. A. Sweeney, superintendent of the Cincinnati, Hamilton & Dayton at Dayton, Ohio, has been appointed trainmaster on the Southern division of the Chicago Great Western, with office at Des Moines, Iowa, succeeding W. G. Hunter, resigned.

Edwin C. Keenan has been appointed superintendent of telegraph of the Lake Shore & Michigan Southern, the Lake Erie, Alliance & Wheeling and the Dunkirk, Allegheny Valley & Pittsburgh, with office at Toledo, Ohio, succeeding William Kline, retired. Mr. Keenan will also represent the Western Union Telegraph Co.

W. L. Connelly, trainmaster of the Chicago, Indiana & Southern at Danville, Ill., has been appointed superintendent of telegraph of the Chicago, Indiana & Southern and the Indiana Harbor Belt, with office at Gibson, Ind., succeeding Thomas Brennan, transferred. Mr. Connelly will also represent the Western Union Telegraph Co.

Charles Ware, whose appointment as general superintendent of the Union Pacific, with office at Omaha, Neb., has been announced in these columns, was born in January, 1863, at Jonesboro, Ill. He was educated at the Southern Illinois University and served eight years on the Iowa division of the Chicago & North Western as train despatcher and later as chief train despatcher. In 1890 he went to the Union Pacific, where he was consecutively to 1905 train despatcher, chief train despatcher and assistant superintendent of the Nebraska division. For the past five years he has been superintendent

of the Nebraska division, from which position he was promoted to general superintendent.

J. Lasseter, who has been appointed superintendent of the Mobile division of the Southern Railway, with office at Selma, Ala., as announced in these columns, was born near Tuskogee, Ala., April 7, 1863. He began railway work in the agent's office of the Louisville & Nashville as messenger boy and a year later, while in the service of this company, he studied telegraphy. From 1877 to 1881 he was employed as operator and agent at various places on the same road. In 1881 he was appointed despatcher on the Memphis & Charleston, now the Memphis division of the Southern Railway. He was promoted to chief despatcher in 1890, since which time he has been consecutively, trainmaster in 1901, assistant superintendent in 1906, superintendent of the Selma division in 1907, and again trainmaster in 1908. This change was brought about by the Southern's policy of rigid economy and consolidation of divisions following the panic. He remained as trainmaster until his recent appointment as superintendent.

J. Lasseter.

Traffic Officers.

E. J. Dowie has been appointed an industrial agent of the Cleveland Short Line, with office at Cleveland, Ohio.

M. B. Irwin has been appointed live stock agent of the Chicago, Rock Island & Pacific, with office at St. Joseph, Mo.

C. E. Carleton has been appointed a soliciting freight agent of the Trinity & Brazos Valley, with office at Houston, Tex.

C. R. Krause has been appointed a soliciting agent of the Atlanta, Birmingham & Atlantic, with office at Kansas City, Mo.

E. H. Dallas has been appointed a district passenger agent of the Gulf, Colorado & Santa Fe, with office at San Antonio, Tex.

Frank N. Newman has been appointed a district passenger agent of the St. Louis & San Francisco, with office at Denver, Colo.

F. N. Hicks has been appointed a traveling emigration agent of the Chicago, Milwaukee & St. Paul, with office at Chicago.

A. B. Moseley, traveling passenger agent of the Oregon Short Line, with office at Ogden, Utah, has resigned to engage in other business.

George E. Reynolds has been appointed a commercial agent of the Louisiana Railway & Navigation Company, with office at Alexandria, La.

Wm. F. Morris, Jr., traveling freight agent of the Great Northern, with office at Buffalo, N. Y., has resigned to engage in other business.

W. T. Spicer has been appointed a traveling passenger agent of the Colorado & Southern, with office at Fort Collins, Colo., succeeding N. P. Bilter, transferred.

P. L. Sheppard has been appointed a traveling freight agent of the Indiana Harbor Belt, with office at Chicago, succeeding C. R. Coughlin, resigned to accept service elsewhere.

H. A. Cherrier, city passenger agent of the Chicago, Burlington & Quincy at Chicago, has been appointed general agent in the passenger department, with office at Chicago.

Harvey Kidwell has been appointed a traveling freight agent of the Southern Railway, with office at Atlanta, Ga., succeeding R. G. Parks, resigned to accept service elsewhere.

Frank I. Smith has been appointed a commercial agent of the Seaboard Air Line, with office at Denver, Colo., succeeding A. H. Stevens, resigned to accept service with another company.

S. R. Drury has been appointed a general agent in the passenger departments of the Chicago, Burlington & Quincy and the Colorado & Southern, with office at Denver, Colo., succeeding E. A. Cooper.

A. A. Martin, freight claim agent of the Galveston, Harrisburg & San Antonio at Houston, Tex., has resigned to take charge of the claim department of the Texas & Pacific, with office at Dallas, Tex.

W. D. Cornell, traveling passenger agent of the Toledo, St. Louis & Western and the Chicago & Alton at Buffalo, N. Y., has been appointed a district passenger agent of those lines, with office at Cincinnati, Ohio.

O. M. Burkholder, city passenger and ticket agent of the St. Louis Southwestern at Shreveport, La., has been appointed a traveling passenger agent, with office at St. Louis, Mo., succeeding L. E. Saupe, transferred.

J. N. Griswold, division freight agent of the Atchison, Topeka & Santa Fe at Dallas, Tex., has been appointed traffic manager of the Temple Northwestern, with office at Temple, Tex. See item under Executive, Financial and Legal Officers.

M. E. McKirahan, freight claim agent of the San Pedro, Los Angeles & Salt Lake at Los Angeles, Cal., having resigned, that office is abolished, and the duties heretofore performed by the freight claim agent will be assumed by the general claim agent.

J. A. Fitzpatrick, southwestern freight agent of the Toledo, St. Louis & Western and the Chicago & Alton at Dallas, Tex., has been appointed general agent in the traffic department of these roads, the Iowa Central and the Minneapolis & St. Louis, with office at Buffalo, N. Y., succeeding W. J. Leahy, deceased. L. B. Gerner succeeds Mr. Fitzpatrick.

R. E. McGrath, contracting freight agent of the St. Louis & San Francisco at Kansas City, Mo., has been appointed a traveling freight agent, with office at Kansas City, succeeding H. G. Benedict, resigned to go to the Atlanta, Birmingham & Atlantic. W. F. Hutchinson succeeds Mr. McGrath. A. H. Stevens has been appointed a general agent, with office at Denver, Colo.

J. A. McWilliams has been appointed a traveling freight agent of the Southern Railway, with office at Knoxville, Tenn., succeeding C. E. Rising, resigned. The office of commercial agent at Houston, Tex., has been abolished and the following appointments have been made: Walter Shipley, commercial agent at Dallas, succeeding W. T. Rembert, who becomes a traveling freight agent, with office at Dallas, and L. W. Sanderson traveling freight agent, with office at Dallas.

W. W. Richardson, assistant general passenger agent of the Pennsylvania Lines West at Indianapolis, Ind., has been appointed assistant general passenger agent, with office at Pittsburgh, Pa., succeeding J. B. Modisette, promoted. F. A. Bauchens, district passenger agent at Toledo, Ohio, succeeds Mr. Richardson. G. L. A. Thomson, traveling passenger and freight agent at Winnipeg, Man., succeeds Mr. Bauchens, and W. E. Blachley succeeds Mr. Thomson.

Engineering and Rolling Stock Officers.

H. E. Hale has been appointed principal assistant engineer of the Missouri Pacific-Iron Mountain system, with office at St. Louis, Mo., succeeding R. H. Ford, transferred.

W. H. Wilson, superintendent of motive power of the Buffalo, Rochester & Pittsburgh at DuBois, Pa., has resigned, effective April 1, to go to one of the large roads, with headquarters at St. Paul, Minn.

W. B. McLoughlin, engineer maintenance of way on the St. Louis division of the Cleveland, Cincinnati, Chicago & St. Louis, at Mattoon, Ill., has been transferred to the Chicago division, with office at Indianapolis, Ind.

M. A. Zook, engineer maintenance of way of the Chicago

Great Western at St. Paul, Minn., has been appointed resident engineer in charge of grade revision and improvements on the Eastern division, with office at Chicago.

C. M. Tritsch, master mechanic of the Maryland division of the Western Maryland at Hagerstown, Md., has been appointed superintendent of motive power and car departments, succeeding R. C. Evans, resigned. W. J. Bingley succeeds Mr. Tritsch, both with offices at Hagerstown.

The mechanical department of the Great Northern, formerly in charge of G. H. Emerson, who is now assistant general manager at St. Paul, Minn., has been divided, and two superintendents of motive power have been appointed. R. D. Hawkins, assistant superintendent of motive power at St. Paul, has been appointed superintendent of motive power, with jurisdiction over the mechanical and electrical forces, other than locomotives and car shops, and A. C. Deverell, assistant superintendent of motive power at St. Paul, has been appointed superintendent of motive power, with jurisdiction over locomotives and car shops. John C. Sesser has been appointed an assistant engineer maintenance-of-way, all with offices at St. Paul.

Samuel J. Hungerford, whose appointment as superintendent of rolling stock of the Canadian Northern, with office at Winnipeg, Man., has been announced in these columns, was born July 16, 1872, at Bedford, Que. He received a common school education and began railway work as a machinist apprentice in May, 1886, with the Southeastern Railway, now a part of the Canadian Pacific, at Farnham, Que. He was then consecutively machinist apprentice for the Canadian Pacific; a machinist at various places; roundhouse chargeman with the Canadian Pacific at Windsor street, Montreal, and later at Farnham, Que.; locomotive foreman at Lake Megantic, Que.; general foreman at McAdam Junction, N. B.; locomotive foreman at Cranbrook, B. C.; master mechanic on the Western division at Calgary, Alta., and superintendent of locomotive works at Winnipeg. Since January, 1908, he has been superintendent of shops at Winnipeg, which position he resigned to become superintendent of rolling stock of the Canadian Northern and the Duluth, Rainy Lake & Winnipeg, with office at Winnipeg.

S. J. Hungerford.

OBITUARY.

Richard S. Simmons, traveling freight agent of the Chicago, Rock Island & Pacific, with office at Kansas City, Mo., died at Kansas City March 16.

W. Frank Wilson, assistant manager of the New York Central Fast Freight Lines at Buffalo, N. Y., died March 17 while traveling on a train. Mr. Wilson was born January 11, 1846, at Chicago, and began railway work in 1863 as a clerk in the office of the Chicago, Burlington & Quincy at Chicago.

A. F. Sortwell, president of the Montpelier & Wells River and vice-president of the Barre Railroad, died March 21 of heart disease at his home in Cambridge, Mass. Mr. Sortwell was born July 21, 1854, at Boston, and was educated at Phillips Academy at Andover, Mass. He was elected vice-president of the Montpelier & Wells River in 1889 and was made president in November, 1894. He also held a number of offices in the Cambridge city government and was mayor of that city in 1897 and 1898.

Railway Construction.

New Incorporations, Surveys, Etc.

AMERICAN CENTRAL.—Preliminary survey is now being made by J. B. Taylor & Co., 37 Liberty street, New York, from Miami, Tex., southeast via Mobeetie and Wheeler to Texola, Okla., and through Mangum and Olustee to Vernon, Tex., 160 miles. Financial arrangements are made to build the line. The project is financed by New York and London capitalists. W. E. McClintock, chief engineer, Mobeetie. (Jan. 14, p. 113.)

BALTIMORE & OHIO.—A contract has been given to the Robert Grace Co., Cleveland, Ohio, and work will be started at once building an extensive freight terminal at Chicago Junction, Ohio, on the main line of the Chicago division. The new terminal will be the largest west of Brunswick, Md., and second in size on the system. The improvements are to include a gravity or hump classification yard, having a capacity of 3,900 cars with the necessary yard buildings, scales, etc., and a water reservoir, to have a capacity of 200,000,000 gals. The new freight terminal will contain receiving yards, to have a capacity for 2,000 cars, and classification yards, to have a capacity for 1,900 cars. Chicago Junction is the terminus of the Chicago and New Castle divisions, and at the intersection of the Newark division lake line to Sandusky. It is the most important locomotive terminal on the Baltimore & Ohio. It is estimated that the work will include the excavation of 950,000 cu. yds. and the construction of 4,500 cu. yds. of concrete for the terminal. The cost of the improvements will be $1,500,000.

BROWNWOOD NORTH & SOUTH.—A contract has been given to the Texas Building Co., Fort Worth, Tex., it is said, for building 20 miles of this line from Brownwood north to May. It is expected that grading work will be begun at once. The line is eventually to be extended further north to a point on the Texas & Pacific. John Mead, chief engineer, Brownwood. (Feb. 25, p. 428.)

CARLTON & COAST.—An officer writes that contracts are to be let in April to build from Carlton, Ore., northwest to Fairdale, Yamhill county, 14 miles, and work is to be started in April. There will be two bridges and several trestles on the line. Chas. E. Ladd, president; W. B. Dennis, vice-president and general manager, 505 Concord building, Portland. (March 11, p. 546.)

CHARLES CITY & WESTERN.—Organized in Iowa, with $300,000 capital, to build 20 miles of line from Charles City, Iowa, southwesterly. C. W. Hart, president, and A. W. Dennis, Charles City, is interested.

CHERRYVALE, OKLAHOMA & TEXAS.—An officer writes that engineers are now in the field making the final and definite location for this line. The plans call for a line from Cherryvale, Kan., southwest towards El Paso, Tex., with a branch south towards Aransas Pass, and another branch south to South McAlester, Okla.; also one from Caney, Kan., southeast towards Fayetteville, Ark. The company expects to let grading contracts this month. Preliminary surveys are under way from Cherryvale, Kan., southwest towards Mangum, Okla., 235 miles, as well as for a branch from Caney southeast via Vinita, Okla., 78 miles. The first work to be carried out will be on the branch via Vinita. S. M. Porter, president, Caney, and B. J. Dalton, chief engineer, Lawrence. (March 18, p. 749.)

CHICAGO, BURLINGTON & QUINCY.—An officer writes regarding the reports that surveys are being made for a line from Mexico, Mo., west to Kansas City, that some surveys are being made near Carrollton for a line between St. Joseph and Mexico, but there is no immediate prospect of the company building the line. Surveys are not being made for a line to Kansas City.

CHICAGO, MILWAUKEE & PUGET SOUND.—This company has definitely decided upon the route to be followed by its projected branch to Everett, Wash. From the main line at Moncton, Wash., a small station 39 miles east of Seattle, the line will pass through North Bend and then will follow the Snoqualmie river valley to the junction of that river and the Skykomish at a point about seven miles scuth of the town

of Snohomish, thence through the Snohomish river valley to Snohomish and Everett, 52 miles. The upper end of the Snoqualmie valley is narrow and winding, with mountain grades. After the junction of the Snoqualmie and Skykomish rivers, however, it widens into a valley floor of from one-half mile to one mile in width. The entire route is heavily timbered. The contract has been let to H. C. Henry, Seattle, Wash. The ground for extensive terminals upon the Snohomish flats in Everett has already been procured and construction will be commenced at once. (Feb. 18, p. 379.)

Durham & Charlotte.—See Sanford & Troy.

Franklin & Abbeville.—An officer writes that a contract has been given to J. M. Sullivan, New Iberia, La., for the grading, and to M. Baugh, Cades, for track and bridge work for an extension from David junction, in Iberia parish, northwest via Kingsville to Milton, about 20 miles. Track laid on 9½ miles. The company also has plans made for putting up two stations as well as carrying out some bridge or tunnel work on the line. (Sept. 17, p. 520.)

Georgia Roads.—According to press reports financial arrangements have been made, surveys completed and contracts are to be let at once for a line from Toccoa, Ga., south to Carnesville, 20 miles. W. S. Erwin, Clarkesville, Ga., may be addressed.

Grand Trunk Pacific.—An officer writes that a contract has been let to J. D. McArthur, Winnipeg, Man., for completing the remaining 135 miles on the Tofield-Calgary branch, in Alberta. A contract has also been given to the same contractor for completing the Melville-Regina branch from Bacarres, Sask., southwest to Regina, about 60 miles. A contract has been given to Rigby-Hyland & Plummer for the extension of the Yorktown, Sask., branch north to Canora, about 30 miles. It is intended to complete this work during 1910.

Idaho & Washington Northern.—An officer writes that a contract has been given to Grant, Smith & Co., Spokane, Wash., for an extension from Ione, Wash., north to Metaline, 10 miles, and work is now under way. Maximum grades will be 0.3 per cent. and maximum curvature 6 degs. The work involves handling about 50,000 cu. yds. per mile. There will be one 600-ft. tunnel, a large trestle and a bridge over the Pend Oreille river. (Jan. 7, p. 68.)

Iowa & Omaha Short Line.—According to press reports grading work, which was suspended early in the winter, has been resumed on this line. It is expected to have the line in operation from Council Bluffs, Iowa, to Treynor, 15 miles, by July 1. George W. Adams & Co., Walnut, Iowa, are the contractors. The office of the company is at 410 Fifth avenue, Council Bluffs. (Nov. 12, p. 943.)

Johnstown & Altoona.—Surveys made and, it is said, financial arrangements completed to build from Johnstown, Pa., northeast to Altoona, about 40 miles. Contracts for the work are to be let in June. G. Holman, chief engineer, Johnstown.

Kansas Roads.—The Electric Traction Construction Co., Scarritt building, Kansas City, Mo., want to sub-let 25 miles of railway work in Kansas. The grading and other work involves the handling of about 402,300 cu. yds.

Memphis, Pensacola & Northwestern.—Organized in Mississippi to build from Memphis, Tenn., southeast to Pensacola, Fla., about 400 miles. The projected route is via Plumpoint, De Soto county, Miss., on the Tennessee border, southeasterly through Mississippi via Meridian and Clarke county, thence through the southwest corner of Alabama to Pensacola. J. M. Dockery, H. T. Bruce, S. W. Jones, B. G. Hening and D. S. Rice, Memphis, are interested.

Nebraska, Kansas & Southern.—A contract is said to have been given to Smith & Scott, Garden City, Kan., for building a section of this line. The company was organized to build from Garden City northeast eventually to Stockton, about 162 miles. Track laid from Garden City east about 15 miles. Baxter L. Brown, chief engineer, 610 Laclede building, St. Louis, Mo. (Nov. 26, p. 1037.)

New Park & Fawn Grove.—An extension is to be built from Fawn Grove, Pa., east to Delta, 8½ miles, with spurs to slate quarries in that section.

Nueces River Valley.—An officer writes that contracts will be let within the next 90 days to build from Beeville, Tex., west via Oakville, Tilden, Cotulla and Carrizo springs to Eagle Pass, about 17 miles. There will be two steel bridges and 16 station buildings. William A. Frisby, president; John Andrewartha, chief engineer, Beeville. (March 4, p. 461.)

Payette Valley.—Contracts are to be let in April to build a 19-mile extension of this road. The company operates a 13-mile line from Payette, Idaho, southeast to New Plymouth, and has preliminary surveys made for an extension from New Plymouth to Emmet. (Nov. 26, p. 1038.)

Quanah, Acme & Pacific.—According to press reports financial arrangements have been made to build an extension from Paducah, Texas, southwest to El Paso, about 375 miles. Surveys finished from Paducah to the New Mexico state line. The original plans called for a line from Paducah west via Roswell, N. Mex., thence southwest to El Paso, but it is now intended to build the line through New Mexico at a point about 50 miles south of Roswell. (March 4, p. 461.)

Rome & Northern.—Surveys are being made for an extension from Gore, Ga., northeast to Tunnel Hill, 33 miles, and contracts are to be let in April. The company now has a 20-mile line from Rome north to Gore, and was organized to eventually extend the line north to the Tennessee state line at a point about 80 miles north of Rome. H. M. Smith, chief engineer, Rome. (Nov. 26, p. 1038.)

St. Louis & Pacific.—According to press reports this company is to build a line from St. Louis, Mo., southwest to Fort Smith, Ark., 310 miles. A. Busch, St. Louis, and Joseph Ramsey, Jr., president of the Ann Arbor, with office at New York, are said to be back of the project. It is estimated that it will cost $70,000 a mile to build the line.

San Antonio, Rio Grande & Tampico.—A grading contract is said to have been given to W. O. Robertson, San Antonio, Texas, and work is now under way from San Antonio southwest. The company was organized to build from San Antonio southwesterly to a point in La Salle county, about 90 miles. The Harrison Engineering Co., New York City, are the general engineers and contractors. G. W. Nock, chief engineer, San Antonio. (Feb. 25, p. 429.)

Sanford & Troy.—An officer writes that this company has finished work on nine miles of line from Gulf, N. C., southeast towards Colon. Work is to be carried out this spring and summer to complete the line from Colon southwest to Sanford. Grading remains to be finished on 3.8 miles. The work will be easy and will probably be carried out by the company's men. J. B. Lenning, president, Bridesburg, Pa.; E. G. Segroves, chief engineer, Star, N. C., are also officers of the Durham & Charlotte.

Savannah, Augusta & Northern.—See an item in regard to this company under Railway Financial News.

Union Pacific.—According to press reports this company during 1910 plans to make improvements and build extensions in the section immediately north of Denver, Colo. The work of double-tracking from Pullman to Sand Creek has been started. This line is to connect with the new line being built from Denver to Greeley. The improvements include a bridge over Sand creek. The line is already double-tracked from the union station to Pullman. (Oct. 29, p. 829.)

The new freight line, via Fort Morgan, Colo., will not use the Kansas Pacific for a short distance east of Denver, as was at first intended, but is to build an entirely new line from the present Denver-Cheyenne line at Sand Creek. It will parallel the Burlington for six miles north of Sand Creek. Grading work is to be started at once. (Feb. 11, p. 329.)

Western Maryland.—Bids are wanted on or before April 1 for building the branch from Cumberland, Md., northwest to a connection with the Pittsburgh & Lake Erie at New Haven, Pa., about 83 miles. The new line will be apparently about 10 miles shorter than the main line of the Baltimore & Ohio between these two places. From Cumberland the projected route is directly west, running south of Savage mountains to Salisbury junction, from which point to Connellsville the line will parallel the Baltimore & Ohio. Between Salisbury junction and Confluence the new line will cross the Casselman river five times, and from that point to Confluence it will cross the Youghiogheny three times. It is said the improvements include one tunnel, about a mile long, and several shorter tunnels. (March 11, p. 548.)

Railway Financial News.

ANN ARBOR.—As noted in another column, Eugene Zimmerman has resigned as president, and Joseph Ramsey, Jr., who is an associate of Newman Erb, has been elected president. The new directors representing Erb interests are W. J. Woolman, W. M. Wadden and LeRoy Baldwin. Newman Erb, Joseph Ramsey, Jr., and H. H. Harrison were already members of the board of directors, so that now there are six directors representing Erb interests.

BOSTON & MAINE.—See Boston Railroad Holding Co.

BOSTON RAILROAD HOLDING CO.—The Massachusetts Railroad Commission has approved the issue of $1,357,300 stock, the proceeds to be used to pay for Boston & Maine stock recently purchased. (Feb. 15, page 430.)

CANADIAN NORTHERN.—The company sold in London from March 7-9 £1,000,000 ($5,000,000) 4 per cent. perpetual consolidated debenture stock at 95 per cent. When all stock subscribed to has been fully paid for there will be outstanding £6,792,750 ($33,963,750.) The company is now operating 3,180 miles of line, which includes 665 miles of leased line.

CHESAPEAKE & OHIO.—See an article in regard to this company and the Hocking Valley in another column.

CHICAGO, MILWAUKEE & ST. PAUL.—Arrangements have been made to extend the $2,155,000 Milwaukee & Northern first mortgage 6 per cent. bonds, which mature June 1, 1910, to June 1, 1913, the extended bonds to bear interest at the rate of 4½ per cent.

HOCKING VALLEY.—See an article in regard to this company and the Chesapeake & Ohio in another column.

ILLINOIS TUNNEL CO. (CHICAGO SUBWAY).—Sutro Bros. & Co., New York, are offering a block of 6 per cent. receiver's certificates of 1910-April 1, 1912, at 99¼, yielding 6.40 per cent. on the investment. The total issue of receiver's certificates is $3,500,000, and they are prior in lien to $36,000,000 first mortgage bonds. The Illinois Tunnel Co. owns and operates 58 miles of tunnels for the transportation of merchandise, and has connections with the freight stations of all railways in Chicago, except the Grand Trunk.

LONDON & NORTHWESTERN.—The gross earnings for the year ended December 31, 1909, amounted to £15,125,111 ($75,625,555); expenses of operation, including taxes, amounted to £9,859,592 ($49,297,960); after paying dividends of £5,344,226 ($26,721,130) and charging off £50,000 ($250,000) to general reserve account, the company had a gross corporate surplus of £17,160 ($85,800). The total number of passengers carried amounted to 81,103,351, and the total tons of freight carried amounted to 52,139,454 tons.

NEW JERSEY & PENNSYLVANIA.—A new issue of $200,000 first mortgage 5 per cent. bonds has been authorized. (March 18, p. 752.)

PENNSYLVANIA RAILROAD.—A committee of the whole has reported to the Hudson County Board of Taxation of New Jersey that it recommends an assessment of $8,460,000 on the property of the Pennsylvania Tunnel & Terminal Co. for the years 1905-1909 inclusive. The Pennsylvania T. & T. is the company which built and owns the Pennsylvania tunnel under the Hudson river. The portion of this tunnel included in this taxation runs from the state boundary line under the Hudson river, under Weehawken, West Hoboken and North Bergen to the western portal of the tunnel, and the taxation also includes the railway property on the surface west to a connection with the Pennsylvania's main line.

ST. LOUIS & SAN FRANCISCO.—The $7,500,000 5 per cent. notes due January 1, 1911, are to be called for redemption July 1, 1910. New St. Louis & San Francisco, New Orleans, Texas & Mexico division first mortgage 5 per cent. bonds, due March 1, 1940, which will be either a direct first mortgage on the St. Louis, Brownsville & Mexico, the Colorado Southern, New Orleans & Pacific, the Beaumont, Sour Lake & Western and the Orange & Northwestern, or a first lien on all the first mortgage bonds and stocks of these companies which are to be issued. Of these bonds, of which the total authorized issue is $50,000,000, $26,000,000 are to be sold in the near future. Stockholders are soon to be asked to approve the retirement of the first and second preferred 4 per cent. non-cumulative stock of the company, of which there is now outstanding $5,000,000 first and $16,000,000 second, and the issue in place thereof of new 7 per cent. preferred stock.

The directors have approved the plan for the practical merging of the roads named above and have elected Hans Winterfeldt, of Speyer & Co., a director to fill the vacancy caused by the resignation of R. A. Jackson. Speyer & Co. and William Salomon & Co., of New York, and G. H. Walker & Co., of St. Louis, will handle the securities to be issued. Speyer & Co. have bought from the company and have sold to investors here and abroad $8,000,000 three-year 5 per cent. gold notes, due March 1, 1913.

SAVANNAH, AUGUSTA & NORTHERN.—This road, of which 25 miles have been completed and 20 miles are under construction, has been sold for $250,000 to W. J. Oliver, Knoxville, Tenn., the contractor, who held a claim for $286,516.

STAMFORD & NORTHWESTERN.—The Railroad Commission of Kansas has approved the issue of $1,872,880 first mortgage 30-year 6 per cent. bonds, to be secured by a mortgage on 82½ miles of track running from Stamford to Spur, Tex. This road is controlled by the Colorado & Southern.

TELLICO RAILROAD.—According to the *Knoxville Sentinel*, this road, which crosses the Louisville & Nashville at Englewood, Tenn., has been sold to the L. & N., and local interests are expecting that it will be extended from its western terminus northward to Harriman, Tenn. The present line is 24 miles long; 16 miles east from Englewood to Tellico Plain and eight miles west from Englewood to Athens. At Athens it connects with the Southern Railway. The road was built in 1887 as the Athens & Tellico. In 1888 the name was changed to the Nashville & Tellico and, after a receivership, came forth as the Nashville, Tellico & Charleston. In 1897 it was again put into a receiver's hands, and the next company was the Tellico Railway Co. According to *Poor's Manual*, the company owns three locomotives and 32 cars, and the cost of the road to the last owners was $10,000. The *Knoxville Sentinel* says that the road "is free from debt and a money maker."

TWIN CITY RAPID TRANSIT.—The Minneapolis, St. Paul & Suburban Railway has been incorporated with a capital of $1,000,000. The Minnetonka & White Bear Navigation Co. and the Rapid Transit Realty Co. have been incorporated, each with $250,000. The supreme court decided recently that the suburban lines of the Twin City Rapid Transit are railways, and amenable to the Minnesota 4 per cent. gross earnings tax. This being the case, it was decided to rearrange the incorporation in such manner that the suburban lines, the steamer lines operated on Lake Minnetonka and White Bear lake, and the hotels, restaurants and amusement enterprises of the company might be handled separately for taxation and accounting purposes, and the new companies have no greater significance, it is said.

VANDALIA.—Speyer & Co., New York, have bought $5,000,000 Vandalia consolidated mortgage 4 per cent. bonds, due 1957. The bonds are a first mortgage on about 550 miles of road including equipment, of the Vandalia lines, which are part of the Pennsylvania system, the Pennsylvania Co. owning a majority of the stock of the Vandalia Railroad Co.

WESTERN MARYLAND.—Stockholders are asked to approve the issue and sale of $25,469,670 authorized common stock, and this amount is offered to stockholders at 50, both common and preferred, to the extent of 75 per cent. of their holdings. The sale of the stock has been underwritten by Blair & Co., New York. The company estimates that it will be necessary to provide $12,700,000 for the extension of the line from Cumberland, Md., to a connection with the Pittsburgh & Lake Erie at Connellsville, and the present sale of stock is for the purpose of raising this amount. See this company under Railway Construction.

Supply Trade Section.

The Hobart-Allfree Company, Chicago, has opened an office in New York City at 50 Church street, room 1824.

The Bass Foundry & Machine Co., Lenoir City, Tenn., has sold its plant to the Lenoir Car Works, of the same place.

The Railway Brake Shoe Co., Washington, Pa., has been organized to engage in the manufacture of a patent brake-shoe for railways. The incorporators are J. L. Cohnagan, G. O. De Vaughan and Eli Gray, all of Washington.

The St. Louis offices of the contract agent of the Electric Storage Battery Co., Philadelphia, Pa., which are at present located in the Wainwright building, will, on March 28, be moved to 1205-6-7 Fullerton building, St. Louis, Mo.

The Patton Paint Company announces the opening of a New York office in the Hudson Terminal building, 50 Church street, room 1366. This office will be headquarters for salesmen representing the eastern factory at Newark, N. J.

The Browning Engineering Co., Cleveland, Ohio, is frequently called upon to furnish good operators for its locomotive cranes. At the present time the concern has more openings than men and wants the names of such operators as are available.

The Ward Equipment Company, New York, has found it necessary because of the volume of business to increase the floor space used for offices and warerooms. It has rented all the stores and offices at 139-143 Cedar street, which will be arranged for general offices and stock-rooms.

The Griffin Wheel Co., Chicago, will on May 1 move its general offices from the Western Union building to the twelfth floor of the new McCormick building, Michigan avenue and Van Buren street. The company has occupied its present offices in the Western Union building since November, 1888.

The Isthmian Canal Commission will receive bids until April 5 for boiler feed pumps, steel, boiler tubes, chain, bolts, rivets, screws, copper, muntz metal, sheet zinc and lead, twist drills, taps, dies, pipe cutters, tube expanders, boilermakers' clamps, fusible plugs, cellar bolt keys, saws, files, jacks, pulleys, valves, coach varnish, etc. (Circular No. 567.)

Ned Boughter, department manager of the U. S. Metal & Manufacturing Co., New York, died at Lebanon, Pa., of pneumonia on March 21, after an illness of about 10 days. Mr. Boughter was well and favorably known throughout the iron and steel trade in eastern Pennsylvania and New York state, and was at one time in partnership with former Mayor Hess, of Lebanon. The death of Mr. Boughter causes the loss of a very efficient and conscientious representative.

At the annual meeting of the Cambria Steel Company, in Philadelphia, March 15, Charles S. Price, vice-president, was elected president in place of Powell Stackhouse, who retires after 53 years' service with the company. Mr. Stackhouse has been president since 1891, and the stockholders, in accepting his resignation, adopted complimentary resolutions. A. P. Robinson was chosen first vice-president, in place of Mr. Price, and J. Leon Replogle, heretofore assistant to the general manager, will now fill the new position of assistant to president.

The Titan Steel Castings Co., Newark, N. J., will be represented in Chicago by R. B. Clark, Jr., with office at 757 Monadnock building. Mr. Clark was formerly assistant general manager of the Merchants Despatch Transportation Co., which position he resigned to become sales agent of the Scullin & Gallagher Iron & Steel Co., St. Louis, Mo., in the Chicago district, from which he was later transferred to New York. On February 1 last he left this company to enter business for himself and his present connection with the Titan Steel Castings Co. is but one of several interests which he now has.

J. B. Crawford has been appointed sales manager of the Whipple Supply Co., New York. Mr. Crawford has had a wide experience and is well known in the electric railway world. His early training was obtained in New England with the Hartford Street Railway and the Groton & Stonington Street Railway. During the last few years he has been located in the central states at different times with the Fort Wayne & Wabash Valley Traction Co., Ft. Wayne, Ind., and the Lexington & Interurban Railways, Lexington, Ky. Just previous to entering the employ of the Whipple Supply Co. he was superintendent and purchasing agent of the Winona Interurban Railway, Winona Lake, Ind.

At the annual meeting of the board of directors of the Keller Manufacturing Company, Philadelphia, the following officers were elected: Julius Keller, president; W. P. Pressinger, Wm. H. Keller, S. W. Prince, vice-presidents; Francis J. Rue, treasurer; C. S. Bell, secretary. The Keller Manufacturing Company has purchased the business of the W. P. Pressinger Company, of New York, its general eastern distributor and distributor for Michigan, and this territory will hereafter be handled direct by the Keller Manufacturing Company. J. J. Swan, secretary of the W. P. Pressinger Company, will be associated with the Keller Manufacturing Company. Chas. Strader has been placed in charge of western agencies, with offices at Chicago and Lincoln, Neb.

McCord & Co., Chicago, have purchased the window fixture and accessory business of the Grip Nut Co., Chicago, and will conduct the business in the future. All correspondence referring to these specialties should be addressed to the McCord Co., Old Colony building, Chicago. This purchase in no way affects the manufacture and sale of grip nuts. The capacity of the Grip Nut Company plant was found to be overtaxed in the making of grip nuts alone, and it was thought best to dispose of the Universal window fixture business and employ every available means to meet the demand for grip nuts. The company has filled orders during the first 20 days of the present month for 10 times as many grip nuts as it did during the entire month of March two years ago. The plant has been running night and day for some time and it is expected that all back orders will be filled by April 1, and that after that time all new business can be handled quickly. It has been necessary to cancel orders for 300,000 grip nuts on account of the lack of capacity in the plant. At the present rate 225 tons of steel is being made into grip nuts every month, and even this rate will have to be increased to supply the demand.

L. H. Conklin, formerly general manager of the Scranton Electric Co., Scranton, Pa., has been engaged by J. G. White & Co., New York, as engineer in its operating department. After graduating from Pratt Institute, Brooklyn, N. Y., in 1891, Mr. Conklin spent three years in obtaining general shop and construction work experience in New York and Massachusetts. During the next two years he was employed as draftsman, erecting engineer and later assistant superintendent of the Excelsior Electric Co. of Brooklyn. From 1896 to 1900 he was superintendent of the electric department of the Flatbush Gas Co. of Brooklyn, and for the succeeding four years was a partner in the contracting firm of Weiderman & Conklin, New York and Brooklyn. During the years 1904 and 1905 he was in charge of the construction and operation of a hosiery mill in North Carolina, and during the next two years was engaged as engineer, in New England, for A. M. Young, with headquarters at Waterbury, Conn., during which time he remodeled and built several electric properties in New London, Rockville and Stafford Springs, Conn., and also the Woodbury & Waterbury Street Railway Co. From 1907 to 1909 he was superintendent of lighting and general superintendent of the West Penn Railways, Pittsburgh, Pa. During the years 1909 and 1910 he has been general manager of the Scranton Electric Co., Scranton, Pa., which position he has held until his present appointment as engineer in the operating department of J. G. White & Co.

TRADE PUBLICATIONS.

Missouri Pacific-Iron Mountain.—The passenger traffic department of the Missouri Pacific-Iron Mountain route is distributing a reprint of an article from the *Saturday Evening*

Post of January 22, 1910, on "The Story of an Arkansas Farm."

Forge Shop Furnaces.—Catalogue No. 8 from the W. S. Rockwell Company, New York, describes the Rockwell forge shop furnaces, including those for forging, flanging, plate heating, tire heating, angle and beam heating, spring fitting, case hardening, tempering, annealing, etc. These may be adapted for either oil or gas fuel.

Chicago, Burlington & Quincy.—The Land Seekers' Information Bureau of the Chicago, Burlington & Quincy has issued a folder on the Big Horn Basin, Wyoming. In addition to the photographs and description of the country and its products a short, terse argument in favor of that particular locality is printed in red at the bottom of each page.

Marine Engines.—The Fairbanks, Morse & Co., Chicago, has issued catalogue 112B on four-cycle, heavy-duty marine engines, and 113 on two-cycle marine engines for light motor boats. The four-cycle engines are built in sizes from 20 to 100 h.p. with two, three and four cylinders, and two types of two-cycle engines are built, one in sizes from 6 to 45 h.p. and the other in sizes 3½ and 7 h.p.

The Graphose Age.—The Chicago Bearing Metal Co., Chicago, is distributing a small booklet which the title page affirms is a "mixture taken hot from the crucible, poured into the mold of publicity and cast once in a while." This is the first time it has been "cast" but it is evidently the purpose of the company to use this means at intervals to remind railway men that graphose bronze bearings, premium babbitt metals and the other products of the company are still on the market. The description of the products in this booklet is brief and forcefully arranged and enough humor and sane advice is added to make the little book easy reading.

Steam Turbines.—The Kerr Turbine Company, Wellsville, N. Y., has issued two new bulletins, No. 9, "Turbo-Blower Units," and No. 10, "Steam Turbine Generators, Steam Turbine Centrifugal Pumps." The first one illustrates practical outfits for forced and induced draft, gas works service and for furnishing blast for cupolas. The other includes generating sets for electric power and lighting, and pumping units for boiler feeding, fire service, water supply, circulating condenser water, draining pumps and for other service where water must be delivered at moderate or high pressure or against considerable head. Both of these bulletins contain interesting descriptive matter about the construction and operation of Kerr steam turbines. The comparisons between turbine and reciprocating engines are of interest to all who are in charge of or operate steam power plants.

"Concrete in Railroad Construction."—The Atlas Portland Cement Co., New York, furnished free copies of its book on "Concrete in Railroad Construction" to all railway officers and contractors who visited the company's booth during the exhibit of the Road and Track Supply Association in Chicago March 14-19. This book, while intended to advertise Atlas cement, contains much information of interest to the designing engineer and the maintenance of way man. It is largely a compilation of descriptions of specific pieces of concrete construction, arranged by Sanford E. Thompson. Two introductory chapters take up the general advantages of concrete for railway work and the general principles used in designing. Each of the 15 descriptive chapters is introduced by a short general discussion of the requirements for the particular structures taken up in that division, and all are fully illustrated with original photographs and detailed drawings. A number of photographs of miscellaneous structures of general interest are added after the last chapter. The book contains 228 pages, 6½ in. x 9 in., bound in cloth, price $1.

RAILWAY STRUCTURES.

ALTAIR, TEX.—An officer of the San Antonio & Aransas Pass writes confirming the report that a contract has been let to the Weber-Duller Co. for the foundations, and to the Virginia Bridge & Iron Works for the fabricated steel and erecting the bridge to be built over the Colorado river. It is to be a riveted steel structure on concrete piers and abutments, and is to have a height of 45 ft. There will be one 40-ft. span, another of 60 ft. and a third of 275 ft. (March 11, p. 753.)

CARLTON, ORE.—See Carlton & Coast under Railway Construction.

CHICAGO JUNCTION, OHIO.—See Baltimore & Ohio under Railway Construction.

CLEVELAND, OHIO.—According to press reports the Erie will put up a double-track lift-bridge at Cleveland.

COLORADO SPRINGS, COLO.—The railways entering Colorado Springs, it is said, have under consideration the question of building a union passenger station to be used by the Atchison, Topeka & Santa Fe, the Colorado & Southern, the Denver & Rio Grande and the Rock Island.

CONNEAUT, OHIO.—The Bessemer & Lake Erie is said to have given a contract to the American Bridge Co. for steel for a bridge to be built at Conneaut.

HAGERSTOWN, MD.—It is said that the Western Maryland will put up a new station at Hagerstown.

HOUSTON, TEX.—Contract is said to have been given to the Fred A. Jones Construction Co., Houston, by the Southern Pacific, for the hospital building, to cost about $150,000. (March 11, p. 518.)

LUMBERPORT, W. VA.—According to press reports the Baltimore & Ohio is planning to build a bridge over the Monongahela river at Lumberport, to cost $500,000.

MADISON, WIS.—A contract has been given by the Chicago & North Western to G. A. Johnson & Son, Chicago, for the new passenger station at Madison. The work of demolishing the old structure is now under way. It is understood that the railway has under consideration the question of straightening the tracks in the yards, removing the present roundhouse and putting up two new roundhouses, one to be built in South Madison. (Feb. 18, p. 383.)

MILTON, LA.—See Franklin & Abbeville under Railway Construction.

NORTHUMBERLAND, PA.—According to press reports the Pennsylvania Railroad is putting up a new freight house at Northumberland. Contracts have already been let.

RICHMOND, QUE.—An officer of the Grand Trunk writes regarding the reports that this company will build a roundhouse and make other improvements that there is no foundation to the rumor. The company is only making some repairs to the roundhouse at that place. (March 18, p. 754.)

WHEELING, W. VA.—According to press reports the Baltimore & Ohio will spend about $300,000 in building a new freight station and in providing for additional freight terminals at Wheeling.

Experimenting with Heavier Rails in Belgium.

From recent information regarding the testing of heavier rails on a portion of the international railway line from Liege to Welkenraedt, Belgium, Consul H. Albert Johnson says that it appears that the work, commenced in 1907, is now half completed.

It is said that the results so far are highly satisfactory, the trains running on these new rails without jar or shock and much smoother than heretofore. A difficult problem has been strengthening the joints. Fish plates are used, 46 inches in length, resting on three wooden ties, one immediately under the joint of the rails and one at either extremity of the fish joint. This arrangement has given excellent results, eliminating the shock caused by the wheels of cars passing over joints. The new rails weigh 1,026 kilos (2,257 lbs); they are 18 meters (58½ ft.) long, and are screwed to 26 ties. The old rails of 40 kilos (88 lbs.) per meter (39.37 inches) were spiked to 20 ties. Placing the new rails is slow, as traffic is excessively congested.

Late News.

The items in this column were received after the classified departments were closed.

The Maine Central has sold to Lee, Higginson & Co., Boston, Mass., $5,000,000 two-year 4½ per cent. notes, dated April 1, and maturing in 1912.

Owners of 17,000 shares of a total of 44,000 shares of minority stock of Kanawha & Michigan have consented to sell their holdings at $72 per share in accordance with plans outlined in another column.

The following directors have been elected for the Toledo & Ohio Central and the Zanesville & Western: W. C. Brown, W. H. Newman, C. E. Schaff, Horace E. Andrews, L. D. Kelley and F. J. Jerome.

The Chicago Great Western, reported in the *Railway Age Gazette* of February 25 as being in the market for 200 steel-underframe 40-ton box cars, has ordered this equipment from the American Car & Foundry Co.

The Pennsylvania Railroad has not yet fixed the date for the opening of its tunnel and station in New York. The severe winter has delayed the work, especially on the New Jersey meadows and at Sunnyside Yard, Long Island.

The Chicago, Rock Island & Pacific, for which inquiries for 250 refrigerator, 500 automobile and 25 caboose cars have been previously noted in the *Railway Age Gazette*, has ordered 500 furniture cars from the American Car & Foundry Co.

The fifth annual convention of the National Supply & Machinery Dealers' Association and the eighth convention of the American Supply & Machinery Manufacturers' Association will be held jointly in Atlantic City, N. J., May 11-13, 1910.

Negotiations between the Hocking Valley and the Virginian Railway, for the joint construction of a bridge across the Kanawha river at Deepwater, W. Va., have been terminated, owing to the recent sale of the former road to the Chesapeake & Ohio.

The Colorado & Southern, reported in the *Railway Age Gazette* of March 11, as asking prices on a large amount of equipment, including 500 steel gondolo cars, has ordered this equipment from the Pressed Steel Car Co. It is reported that this company has ordered some wooden freight cars from the Mt. Vernon Car Co., but this later item is not confirmed.

The Atchison, Topeka & Santa Fe, it is said, will shortly offer convertible bonds to its stockholders. In the absence of President Ripley, an official statement is lacking, but it is believed that the company will not issue more than about $25,000,000 at this time. There are $43,000,000 of the convertible bonds authorized but still unissued. It is pointed out that the company's last two or three bond issues have been from $26,000,000 to $28,000,000 in amount.

The conference between the trainmen and conductors of the New York Central & Hudson River, through their grievances committees, with Assistant General Manager P. J. Crowley, resulted Wednesday in a declaration on behalf of the men that the terms on which the settlement was recently effected with the Baltimore & Ohio were the lowest that would be accepted. That is, the lowest standard to be accepted would be the same standard of payment for the same kind of work on the different divisions.

The Baltimore & Ohio is holding a series of conferences with representatives of all the coal shipping interests throughout its territory, with reference to the question of revising its system of coal car distribution. A committee consisting of officials of the Consolidation Coal Co., the Virginia & Pittsburgh Coal & Coke Co., the Hutchinson Coal Co., and the Maderia-Hill-Clark Coal Co., representing the leading shippers of the Fairmont region, has already conferred with Transportation Superintendent Galloway of the B. & O. on this question.

Frank Trumbull, chairman of the board of the Chesapeake & Ohio, has been elected also chairman of the board of the Hocking Valley, and G. W. Stevens, president of the Chesapeake & Ohio, has been elected also president of the Hocking Valley. James Steuart MacKie, secretary and treasurer of the Chesapeake & Ohio, has been elected also assistant secretry and assistant treasurer of the Hocking Valley, all with offices at New York. Edwin Hawley, Frank Trumbull, G. W. Stevens, A. C. Rearick and James Steuart MacKie have been elected directors of the Hocking Valley.

The city council of St. Louis has passed a resolution creating a committee of its members to confer with the officers of the individual railways which control the Terminal Railroad Association of St. Louis, with a view to securing the abolition of the bridge arbitraries on traffic within a radius of 100 miles of St. Louis. In its resolution the council authorized co-operation with a committee representing the shippers of the city and declared that if the arbitraries were abolished the assembly would proceed to pass the ordinances necessary for an increase of railway facilities in St. Louis.

The offer of the federal mediators, Messrs. Knapp and Neill, made at the request of the railway companies in the firemen's controversy was accepted by the leaders of the brotherhood at Chicago, and on Monday of this week it was announced that the matters at issue had been compromised, at least to such an extent that there would be no strike. Thus far, however, the details have not been given out, and it does not appear certain that the two parties have come to a complete agreement, except on the one point that the question of wages shall be arbitrated. Questions of seniority and of the way in which employees shall be represented in negotiations with the companies are to be disposed of outside of the arbitration proceedings, which seems to mean that the negotiators do not yet know what to do with these matters.

Vice-President Gray, of the St. Louis & San Francisco, filed a dissenting vote in the federal wage award to the switchmen. Umpire Gregory, differing from the State arbitrators, held that the hazard of the occupation should be recompensed by higher wages. Vice-President Heberling, of the Switchmen's Union, and third member of the arbitration board, signed the decision but did not think the wage increase sufficient. The award will affect eight thousand men and cost the roads $1,250,000. Vice-President Gray, in dissenting, held that the roads were unable to bear the expense, and that the Pere Marquette, Great Western, and Chicago Terminal would be irreparably injured, and that the increased efficiency of the service is due more to the roads than to the men themselves.

FOREIGN RAILWAY NOTES.

The annual report for 1908-1909 of the South Australian Railways' Commissioner says that the permanent survey for the proposed line from Gawler to Angaston, 24 miles, has been completed and the work of construction is shortly to be begun.

The report covering all the railways in the German Empire for the year 1908, recently published, shows that the mileage increased from 30,006 in 1898 to 35,745 in 1908, of which 92.6 per cent. were state railways. There were about 6 square miles of area and 1,766 inhabitants per mile of railway in the latter year.

The Swiss Railways are to invade the rights of smokers. When one takes his place in a compartment labeled for non-smokers, he may not smoke even if all the other occupants consent, and not even if he is the sole occupant of the compartment. Up to this time only one-third of the compartments have been reserved for non-smokers. On cars built hereafter they are to have one-half of them.

In Russia much less new railway was opened for traffic in 1909 than for several years previous, only about 330 miles. There is considerable building under way, however. Russia needs many more railways, but it needs much more to increase the efficiency of the existing lines. And it seems to have done something in this direction. Its last grain harvest was an exceptionally large one, but there has been very little complaint of the blockading of the lines in the fall months, such as has demoralized traffic nearly every other year of late

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Canadian Pacific has ordered two locomotives from the American Locomotive Co.

The Grafton & Upton has ordered one consolidation locomotive from the Baldwin Locomotive Works for June delivery.

The Virginian has ordered 12 Mikado and one eight-coupled switching locomotive from the Baldwin Locomotive Works.

The Union Railroad, Pittsburgh, Pa., has ordered five consolidation locomotives from the Baldwin Locomotive Works.

The New York Central & Hudson River is said to have ordered six locomotives from the American Locomotive Co. This item is not confirmed.

The Temple-Northwestern, a new line building from Temple, Tex., to Benjamin, about 210 miles, will buy motive power within 60 or 90 days. W. J. McDaniel, president, Temple.

The Southern, reported in the *Railway Age Gazette* of March 18 as being in the market for 75 locomotives, has ordered this equipment from the Baldwin Locomotive Works.

The Boston & Maine is said to have ordered 10 locomotives from the American Locomotive Co. This item is not confirmed. This company is in the market for four Mallet locomotives.

The Missouri Pacific, reported in the *Railway Age Gazette* of January 22 as being in the market for 60 locomotives, is said to have ordered 10 switch and 30 consolidation locomotives from the Baldwin Locomotive Works and 20 Pacific locomotives from the American Locomotive Co. This item is not confirmed.

CAR BUILDING.

The San Antonio & Aransas Pass is in the market for 12 caboose cars.

The Cold Blast Transportation Co. is in the market for 75 refrigerator cars.

The Washington, Idaho & Montana has ordered one coach from the American Car & Foundry Co.

The Toledo & Ohio Central is said to be asking prices on 1,200 gondola cars. This item is not confirmed.

The Pacific Fruit Express is said to be considering the purchase of 2,000 refrigerator cars. This item is not confirmed.

The Texas City Refining Co., Texas City, Tex., has ordered twenty 10,000-gal. tank cars from the American Car & Foundry Co.

The Georgia, Southern & Florida has ordered, through the Southern Railway, 100 flat cars from the Standard Steel Car Co.

The Vera Cruz Railway is said to have ordered 25 freight cars from the Barney & Smith Car Co. This item is not confirmed.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered 1,000 30-ton box cars, 300 30-ton stock and 300 50-ton ore cars from the American Car & Foundry Co.

The St. Louis, Brownsville & Mexico is now in the market for 12 caboose cars in addition to the 100 steel underframe box cars reported in the *Railway Age Gazette* of March 11.

The Temple-Northwestern, a new line building from Temple, Tex., to Benjamin, about 210 miles, will buy car equipment within 60 or 90 days. W. J. McDaniel, president, Temple.

The Idaho Northern has ordered one 70-ft. motor car from the McKeen Motor Car Co. This order was unintentionally credited to the Washington & Great Northern in last week's issue.

The Wabash has leased 250 automobile cars from the Mather Horse & Stock Car Co. These cars are being built by the Haskell & Barker Car Co. as mentioned in the *Railway Age Gazette* of March 11.

The United States Express Co., reported in the *Railway Age Gazette* of March 18 as being in the market for 25 refrigerator cars, has ordered 35 cars from the American Car & Foundry Co.

The Chesapeake & Ohio, previously reported in the *Railway Age Gazette* as being in the market for freight equipment, has ordered 3,000 cars, divided equally among the American Car & Foundry Co., the Pressed Steel Car Co. and the Standard Steel Car Co.

The Southern, reported in the *Railway Age Gazette* of March 4 as asking prices on 3,000 coal, 500 coke and 100 flat cars, has ordered 2,000 fifty-ton hopper cars from the Pressed Steel Car Co.; 500 fifty-ton hopper cars from the Standard Steel Car Co.; 500 fifty-ton hopper cars and 500 coke cars from the Cambria Steel Co., and 100 flat cars for the Georgia, Southern & Florida, from the Standard Steel Car Co.

MACHINERY AND TOOLS.

The Isthmian Canal Commission. See item in Supply Trade News.

The Transcontinental Railway Commissioners, P. E. Ryan, secretary, Ottawa, Ont., will receive bids until April 12 for machines and tools; leather belting; shafting hangers, steel frame work, etc.; miscellaneous equipment, industrial track and lockers; motors; furnaces and forges; cranes; air compressers; Grey iron foundry equipment and brass foundry equipment.

IRON AND STEEL.

The Lehigh Valley has ordered 2,200 tons of structural shapes and 800 tons of plates.

The New York, New Haven & Hartford is in the market for 15,000 tons of open hearth rails.

The Elgin, Joliet & Eastern has ordered from the American Bridge Co. 100 tons of structural steel for two plate girder bridges.

The Cleveland, Cincinnati, Chicago & St. Louis is in the market for 5,000 tons of structural steel for the Indianapolis, Ind., shops.

The Kansas City Terminal will soon be in the market for about 18,000 tons of structural steel for the new passenger station and approach work.

The Electric Traction Construction Co., Kansas City, Mo., is in the market for 2,550 tons of 60-lb. relaying rails, also spikes, bolts, nuts, boilers, engines and general equipment for work on 25 miles of railway work in Kansas.

The Southern, reported last week as having ordered 42,000 tons of rails from the Tennessee Coal, Iron & Railroad Co., has divided this order, 30,000 tons being placed with the company mentioned and 15,000 tons with the Maryland Steel Co.

General Conditions in Steel.—The opening of spring weather seems to have had its effect in the rather marked improvement in the steel business during the past week. Although few new contracts came to light, there is a feeling that extensive buying is about to begin. Several standing orders for equipment have just been placed and several new inquiries have just come into the market, which will result in greater activity in shapes and plates. Outstanding inquiries for structural steel throughout the western states are said to exceed 60,000 tons, or nearly double the amount at times seen at this period. These inquiries do not include railway structural steel.

SIGNALING.

Extensive Upper-Quadrant Signaling on Pennsylvania Lines West.

The Pennsylvania Lines West of Pittsburgh intend this year to complete the automatic block signaling of the Pittsburgh,

Fort Wayne & Chicago main line (Pittsburgh to Chicago) by installing signals all the way from Crestline, Ohio, to Chicago, 280 miles; and the signals will be three-position upper quadrant. It is said that the appropriations which have been made for this work amount to $800,000. Most of the material will be furnished by the Union Switch & Signal Company, and some of the work will be done by that company. The signals are to be worked by storage batteries, charged by means of line wires from generating stations.

Motor Cars in Zero Weather.

A party of officers of the Chicago Great Western made an inspection trip last February with a No. 16 Fairbanks-Morse

Motor Car Used in Zero Weather.

motor car which was a notable example of the satisfactory performance of these cars. The run made was as follows: Feb. 17, Oelwein to Clarion, 106 miles; Feb. 18, Clarion to Hayfield and double back to Austin, 125 miles; Feb. 19, Austin to Ft. Dodge, 114 miles; Feb. 20, Fort Dodge to Council Bluffs, 135 miles. The concluding part of this trip was made in the most severe blizzard of the year, with the thermometer 12 deg. below zero and the snow drifting and piling up on the track.

This motor car was made by Fairbanks, Morse & Co., Chicago.

The Main Mills of F. W. Bird & Son.

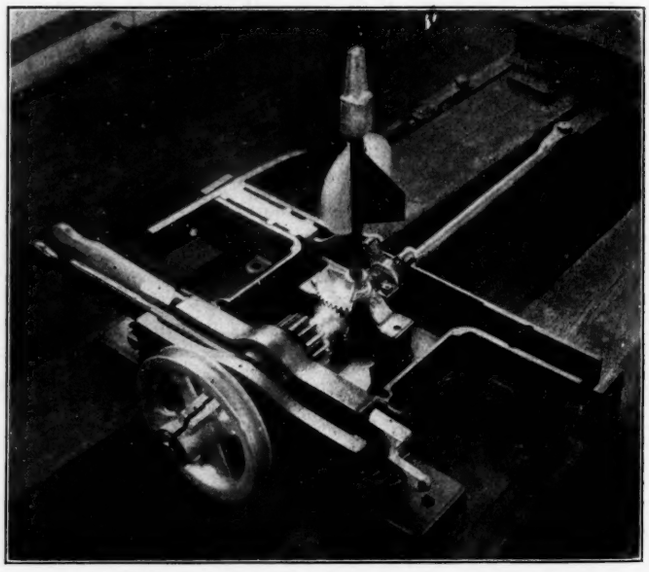
The accompanying cut shows a general view of the main mills of F. W. Bird & Son at East Walpole, Mass. Nearly a century ago the first mill of this company was built near the site of the present mills on the Neponset river. Four generations of the Bird family in direct succession have carried on the same industry and built up what is said to be one of the largest roofing and waterproof building paper plants in the country. The operation of the main plant requires over 5,000 h.p. Branch mills are located at Phillipsdale, R. I.; Norwood, Mass.; Hamilton, Ont., and Pont Rouge, Que. This company makes a ready roofing from felt to fixtures. The roofing is laid with a square rust proof cap, which is said to have more binding surface than the ordinary round cap and is made from new metal.

Paroid roofing is in use on many railway systems, and the United States government, it is said, last year used more than 1,000,000 sq. ft. of it. Proslate roofing is practically the same material as Paroid, except that it has an extra weather surface of brown color, which the makers claim is an advantage over coloring the original coating. This product makes an attractive roof and is being largely used for small railway stations and train sheds. Other products of the company are Paroid sill covers, Paroid car roofing, Neponset insulating paper, Neponset waterproof building paper and Neponset Hydrolyke waterproofing felt.

The Triplelock Switch Stand.

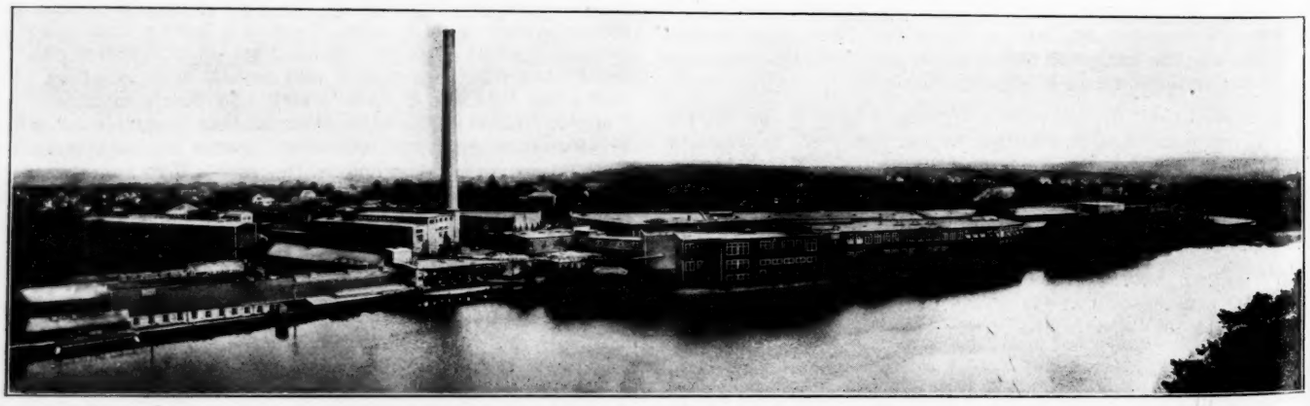
The importance of the safe operating and locking of railway switches at junction points and cross-overs has long been realized. Apparatus have been devised to effectively care for the proposition where switches are grouped, but single switches in the main track, where the trains run at a high rate of speed, have not, it is said, received any great amount of attention. The apparatus that has been devised for groups of switches is an expensive installation for a single switch.

The Triplelock switch stand which has been placed on the



Triplelock Switch Stand with Covers Removed.

market by the W. F. Bossert Manufacturing Co., Utica, N. Y., is intended to have all the features of an interlocking plant. While it is very simple in construction, it is strong and reliable, rigidly locking the switch-points mechanically both in the stand and with duplex bolt blocks. It also controls the mechanical or electrical signal, and can be controlled either from any distant point or by the approach of trains through the action of the track circuit.



Main Mills of F. W. Bird & Son, East Walpole, Mass.